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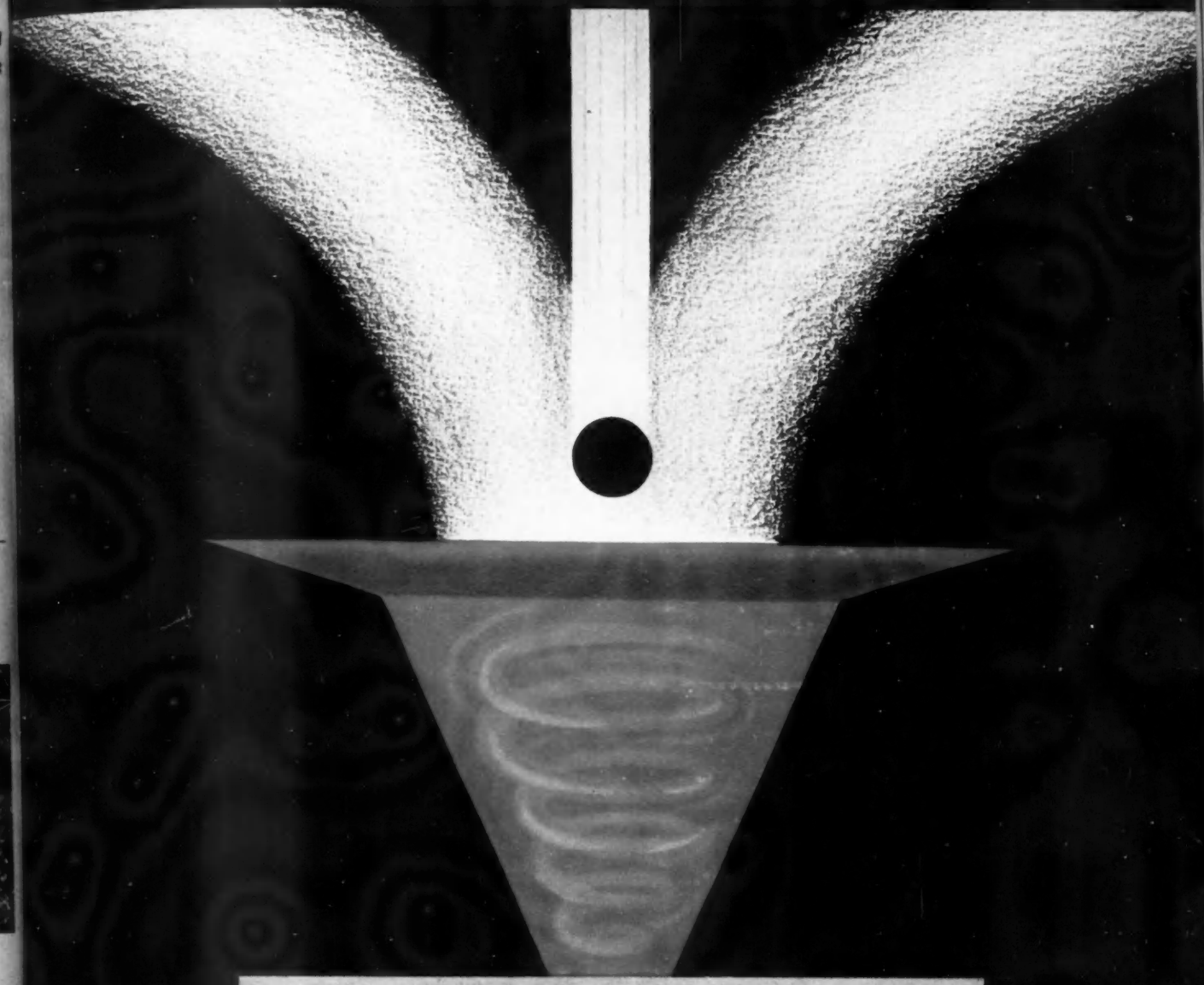

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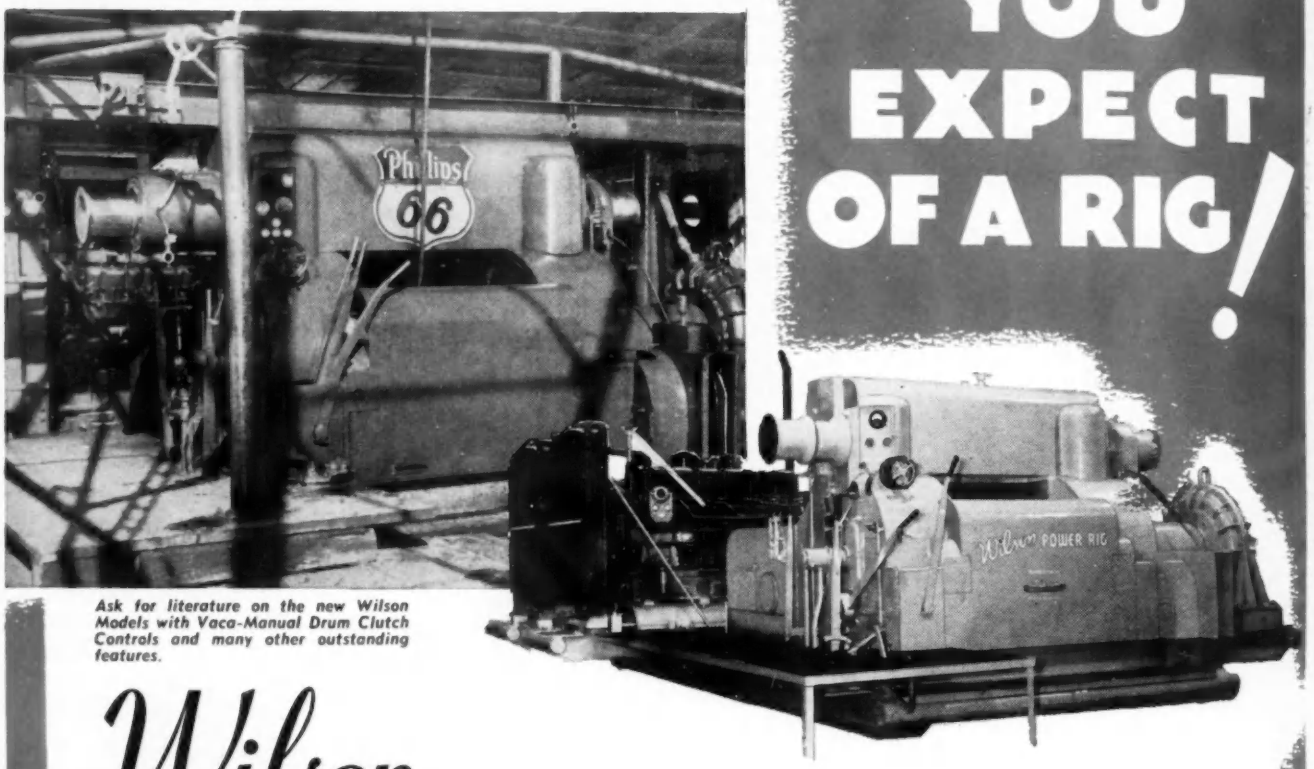

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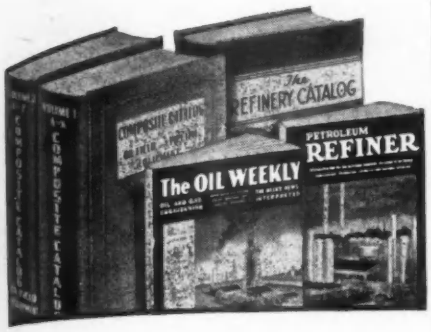

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THE OIL WEEKLY

ENGINEERING • NEWS • STATISTICS

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LOOKING AHEAD
. . . with the Editor

As close a control as is possible of reservoir pressures has now come to be looked upon as fundamental in production of oil. Sooner or later petroleum engineering gets back to the question of utilizing pressure to the maximum in getting oil out of the formations, or creating pressure where there is none. Hence in pressure control operations, any knowledge of the natural agents affecting oil recovery is of great importance.

It is apparent that an efficient utilization of gas energy is essential to the attainment of a high ultimate oil recovery efficiency, particularly in those instances of either natural or stimulated production where gas is the major source of expulsive energy. In addition to its function as a displacing agent, gas also plays an important role by reducing the viscosity of the crude petroleum. This increases the mobility of the oil and promotes its recovery efficiency. Hence a knowledge of subsurface conditions adequate to effect an efficient control of gas movements within a reservoir is highly pertinent.

In an early issue, N. Van Wingen and E. P. Valby, Richfield Oil Corporation, will discuss some of the problems of control and detection of reservoir gas movements, with the resulting benefits to pressure control operations.

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The Changing Panorama

Anticipation of Preventing Waste

ACTION by regulatory bodies in anticipation of preventing waste would be a great service of conservation for the petroleum industry and for this nation, in the opinion of Paul Ryan of The M. W. Kellogg Company. In a talk on "A Passing Parade of Petroleum Economics," before Trade Publications of the Petroleum Industry, he pointed to work of the Texas Railroad Commission, as an example worth following.

"For the last 10 years," he said, "the commission has successfully carried on its work to conserve the natural resources of petroleum so necessary for our economic progress. If the Texas Railroad Commission would immediately, upon the signing of the armistice, regain its authority and exercise the responsibility of curtailing production in Texas so as to prevent the accumulation of excess stocks of crude oil in above ground storage, and assert such authority *in anticipation of preventing waste*, the Texas Commission would perform a great service of conservation.

"The only alternative to such action," he continued, "would be the voluntary reduction of production by individual companies. In the past, such voluntary curtailment has never occurred until the pressure of excess stocks above ground has precipitated a reduction in price; any such action in the postwar period, no matter if it was meticulously free from concert and agreement, would undoubtedly be suspected by some governmental departments and would be construed as collusive action to regulate the price of crude petroleum.

"The conservation of our natural resources, therefore, should be carried on by our state regulatory authorities, under the leadership of the Texas Railroad Commission, and should be carried on in anticipation of preventing waste."

Business men who depend on railroads and motor lines to transport the raw materials that go into the manufacture of their products and merchants who sell the finished goods, should continue the same high degree of observance to ODT conservation measures as they did when the outlook for victory was far darker than it is today.

—COL. J. MONROE JOHNSON
ODT

We are going to have to do some very clear thinking if we are to avoid the mistake of assembling a collection of expedients and calling it a national policy.

—WILLIAM L. BATT,
President SKF Industries, Inc.
in "Dun's Review"

Public Seeing Need Of Gas Conservation

FOR a long time there has been concern in the minds of many people in Texas about the waste of natural gas. The flares which used to be so common were an interesting sight; but one could not think about them without regretting that so much gas was being burned into the air with so little benefit being realized from it.

In the past, the cheapness of gas had much to do with this problem. "It has been only a *very* little while since natural gas went begging for outlets—looking for markets in vain," reminds Ernest O. Thompson, of the Texas Railroad Commission. "It looks like," he adds, "we are going to now get a competitive market for gas and perhaps it will go up and bring more nearly what it is worth as a fuel and as a content of liquid hydrocarbons. The natural gas in Texas fields will probably bring more money to Texas than the remaining oil."

As a step toward conservation of this precious resource, late though it be, Colonel Thompson suggests that "One constructive thing would be a rule or law that no oil could be produced unless the gas that comes out with the oil was returned to the reservoir pressure or stored or fully utilized for light or fuel or for manufacturing synthetic products.

"That would be real conservation and waste prevention.

"Heretofore public opinion has not been strong enough behind gas conservation to demand or permit even this measure of waste prevention to be required. Perhaps now the time has come for this rule to be promulgated. It is certainly wholesome to see the public becoming natural gas conscious."

It would take about 1900 miles of tank cars to equal the capacity of all the tankers built since Pearl Harbor. Many of the new tankers move fast enough and are sufficiently armed to run free on the long trek across the Atlantic and the Pacific.

Free Enterprise's War Contribution

TO MAKE it possible for our bombers and our transport planes to fly all over the world with fuel of a quality unheard of before the war, the research laboratories of the great oil companies contributed to the high-octane program their basic information on catalysis.

Thus Colonel Dewey, former rubber director, paid tribute to research as carried on by the oil companies of America. Recently when he was awarded the Chemical Industries Medal from the American Section of the Society of Chemical Industries, he summarized the benefits of industrial and chemical research in a talk on "The Role of Organized Research and Business in American National Defense."

"We must remember," he said, "that in many cases it was the teamwork of scientists, engineers, and production men in big industry which saved us on the production front in this war. . . . It was possible, I think, because American free enterprise in time of peace had given us for the time of war the needed teamwork of scientists and technical men and business men which was able to work the miracles of large scale cooperation."

Salary-Wage Plans An Early "Must"

LACK of attention to placing proper values on job assignments and rewarding individual differences in performance will result in prolonging governmental control of salaries and wages, to the detriment of both management and workers. An orderly approach to the solution of this problem will be a "must" in industry during and following the reconversion period, in the opinion of Samuel L. H. Burk, chief job analyst of The Atlantic Refining Company.

Speaking before the Industrial Personnel Association, in New York, recently, he emphasized the necessity of action to get salary and wage programs started immediately, in order to provide a sound basis for making changes as they occur in job content and wage rates from now on.

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WASHINGTON ROUNDUP

By BERTRAM F. LINZ, Washington Correspondent

ATTENTION of oil interests in Washington was centered last week upon the manpower situation with issuance by PAW of a report on the industry's labor situation in which it warned that a critical shortage of aviation fuels may come within the next six months unless adequate technical personnel can be obtained to head the necessary production and refining operations.

The PAW report was the most important oil development of a week devoted chiefly to evaluating the effect of the recent elections, but there were other events of interest to the industry, few of them, however, of an optimistic nature.

No Tax Reductions—With the return of Congress for the final few weeks of the session, House and Senate leaders made it clear that no immediate income or corporation tax reductions were in prospect and indicated that the first relief to the taxpayers' pocketbooks might not come until 1946.

Steel Situation Eases—The easing of the steel situation was manifest in two PAW orders, one releasing operators from the necessity of filing further reports on surplus materials other than tubular goods and the other increasing from $10,000 to $25,000 the maximum value of material that could be used for certain operations without specific authority. The tubular goods situation, however, remains tight and is expected to continue so for some time to come, due to the accelerated drilling program.

German Industrialists Banned—German industrialists would be permanently barred from acquiring any interest in American concerns, the German cartel system would be wiped out and the tremendous armament industry built by the Nazis abolished under the recommendations made by a Senate subcommittee which has been studying the influence exerted by German cartels on our prewar industry and our preparations for war.

Shortage of Skilled Men—A highly important role in the prosecution of the Pacific war has been mapped out for Caribbean and Persian Gulf oil, but efforts to develop the facilities of those areas are being slowed down because of the lack of skilled men, PAW disclosed in a report in which, however, it had little to offer in the way of a remedy for the situation.

Big Lines and Postwar Oil—An effort to keep the government's two big pipe lines in operation as oil carriers after the war, rather than to convert them into gas lines as feared by some Texas interests, was seen in Secretary of Commerce Jones' suggestions that, at capacity operation at tanker rates, Big Inch and its little brother could show a profit of $100,000 a day, after allowance for depreciation, amortization and interest.

No Heating Oil Increase—Fighting against pressure which is being brought to bear for an increase in heating oil rations, Administrator Ickes told consumers there was no chance of such action this winter and that with the tightening transportation situation they will be lucky if they get all that is now allowed them.

PAW Allocations—December crude production would go ahead in December, PAW certifications calling for a daily average of 5,026,400 barrels which is 2500 barrels daily over November certifications.

Technical Personnel in Industry at Critical Point, PAW Survey Says

Technological problems of the oil industry today are more critical than at any time in its history, "and unless adequate technical personnel can be maintained in the producing units of this industry, there will be be a critical shortage of aviation fuels within the next six months," it was warned last week by PAW.

In an exhaustive survey of the situation, based upon material from its various divisions and from the Department of Labor, PAW declared that every technical man of draft age now employed in the industry must continue to be exempted from military service if military and essential civilian oil needs are to be met.

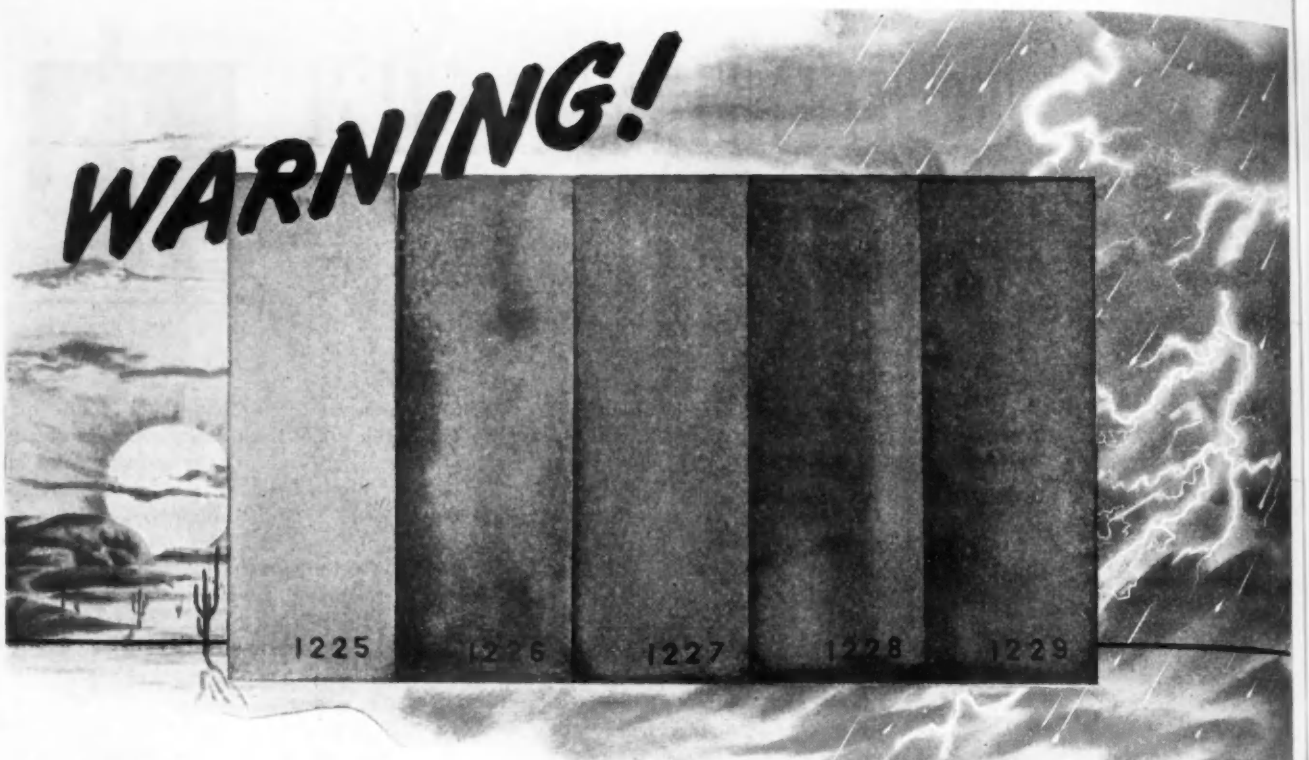
"The problems facing the industry today are in no sense less severe or critical than those which the industry faced in 1942 when it was forced to redesign its entire processing equipment," the report asserted.

The heavy current production of crude and condensate and natural gasoline, which is expected to continue through 1945, even though the war in Europe terminates in the meantime, is substantially above the current maximum efficient productive capacity of the nation's oil fields and "can only be sustained with further expansion in exploration and drilling activities," it was pointed out.

"The high rates of production at which the nation's oil fields are now being produced are placing an enormous physical strain upon the productive capacity of these fields," the report stated. "This strain is being reflected in abnormal pressure declines, rapid water encroachment, and excessive increases in gas/oil ratios. These increasing production problems are severely taxing the limited technical personnel remaining in the production branch of the petroleum industry. The continuation of these high rates of production will increase the number of these difficulties and will require further technical employes in their solution.

"From an over-all manpower standpoint the production branch of the petroleum industry has done an outstanding job of supplying 25 percent more crude oil than ever before with a limited quantity of manpower which was relatively untrained. After reducing its operations by 40 percent and depleting its manpower proportionally during the first two years of the war, the production branch of the industry has obtained personnel for increasing its operations through industry-wide recruiting programs. Intensive training programs have been set up to mold these new men into oil field workers. Even so, the limited number of workers and their lack of training are contributing factors to the current 30 percent inefficiency in drilling operations.

"With respect to the technical personnel employed in the production branch of the petroleum industry, the problem has been even more serious. A large number of these employes held reserve commissions or had specialized technical training which made them particularly desirable to the armed services. Furthermore, it has been impossible to replace this type of per-



What outdoor exposure does to low-purity aluminum pigments

More graphically than words, this photograph tells the facts . . . facts vitally important to maintenance men in the oil industry.

These five test panels were painted with aluminum paints that were identical in every respect except the purity of the metal from which the pigment was made. Flake size was the same. Vehicle the same.

Panel No. 1225 was painted with Standard Alcoa Albron Paste No. 205, made from 99+% pure aluminum. Panel No. 1226, with pigment made from 95% aluminum. Panel No. 1227, from 91% aluminum. Panel No. 1228, from 90% aluminum. Panel No. 1229, from 87% aluminum.

You see what happened after 25 months exposure at New Kensington, Pa., Panel No. 1225, painted with Standard Alcoa Albron, retained excellent color and showed no failure. All of the panels painted with low-grade aluminum pigments darkened and rusted. Those painted with the pigments made of the two lowest purity metals were covered with rust over almost the entire surface, as shown by the dark areas in the photograph.

Clear proof, this, that high-grade aluminum is vitally important for making good aluminum pigment that will stand exposure to the weather.

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sonnel through recruitment and special training programs. Young engineers and geologists coming out of universities have been almost entirely absorbed into the armed services. Accordingly, the number of technical employes engaged in production operations is still 40 percent below normal.

"Of the same 160,000 employes engaged in production operations, less than 10,000, or some 6 percent, are technically trained. However, the serious task of solving the many technical problems attendant to exploration, drilling and production operations rests with this limited segment of employes. A survey early in 1944 indicated that roughly 1200 of these technical employes were under 26 years of age. Despite the extreme shortage of such employes, however, this agency has asked for the deferment of only 250 of these men. The applications received were carefully screened and deferment was requested for only the most critical cases."

Cushion of Oil Absorbed

With the production branch unable to replenish its ranks of technical employes and with the expanded exploratory drilling and production programs now under way, it was declared, PAW has no alternative to recommending the continued deferment of these 250 technically trained young men.

"Fortunately for the nation," PAW said, "a substantial volume of excess oil productive capacity had been built up during the decade preceding the outbreak of the war. This was accomplished by the continued conduct of adequate successful exploration and development programs which resulted in finding and developing more new oil than was being produced and consumed. The excess productive capacity developed in the prewar years has made it possible to meet military and essential civilian requirements to date despite the necessity for a curtailment in drilling operations of 40 percent during the years 1942 and 1943, and of 20 percent during 1944 because of the shortage of steel and other critical materials. This cushion of excess productive capacity has now been completely absorbed. Accordingly, future operations must be geared to finding and drilling new crude oil reserves at a rate commensurate with the required withdrawals from our oil fields.

"New flush fields offer the most fertile source for added productive capacity. Many fields discovered in the last year or two are now making substantial contributions to the war. However, discovery of additional crude oil reserves in new pools and fields during the war has not kept pace with the rate at which our reserves have been produced and consumed. Although the industry's exploratory efforts have been greatly expanded since the outbreak of the war, the volume of new reserves being found has continued to decrease. Estimates of crude oil reserves found in new pools and fields during the war are roughly equivalent to half of the volume of oil consumed. The disappointing results obtained from the expanded exploratory program can be attributed to the increasing difficulty of finding new pools and fields, and to the lack of adequate technical manpower to cope with these difficult exploratory problems and to direct and supervise the necessary expanded program of exploration.

"The exploratory drilling program must be expanded from less than 4000 wells in 1944 to at least 5000 wells in 1945. To accomplish this, comparable increases must be made in supporting geological and geophysical activities. In the face of this needed further expansion in exploratory activities, the petroleum industry has been confronted with a loss of some 40 percent of its personnel engaged in exploratory activities. More than 50 percent of the exploratory personnel are technical men. These geologists, geophysicists, observers, and computers are indispensable in the operation and in the interpretation of results of the technical equipment utilized in exploratory activities."

Similarly, it was explained, expansion of drilling operations for production is necessary to offset the rapid decline in productive capacity now being experienced, but while 30,000 to 32,000 new wells would be necessary next year to fulfill that purpose, limitations on facilities, manpower and equipment have limited the PAW program to 27,000 wells.

"This increase in drilling operations will require a proportional increase in manpower," it was pointed out. "Further, since the outbreak of the war, the average depth of the wells being drilled has increased more than 500 feet per well. Many of the more prolific new fields being developed today, such as West Edmond and the Ellenburger pools of West Texas, range in depths from 7000 to 12,000 feet. Problems encountered in this deeper drilling require the close supervision of technical personnel. Although the technical personnel represents a relatively small proportion (2½ percent) of the total personnel engaged in drilling operations, this very fact makes it highly important that adequate technical personnel be available."

Refining Situation Also Grave

Even graver difficulties confront the refining branch of the industry in the important changes in the quality of aviation gasolines which are now planned, PAW stated, decrying the publicity to the effect that aviation gasoline is being produced in an amount equivalent to military requirements.

"This publicity can be an exceedingly dangerous thing to the strategic plans of the chiefs of staff of this country and the United Nations, if the full meaning of the achievement of the industry is not brought to the attention of the proper governmental and public bodies," the report warned, pointing out that the changes now under way in quality will result in substantial reductions in quantity.

No Further Surplus Stock Reports Except for Pipe

Requirements that petroleum operators report surplus stocks of critical material were dropped by PAW November 17 except in the case of tubular goods, in a revision of materials redistribution Program No. 2 made possible by the improved supply situation.

Tubular goods, however, are still tight and it will continue to be necessary to report surplus stocks of such goods when, at an individual location or stockpile, they are in excess of 1000 feet of casing, tubing or pipe from 2 to 8 inches in internal diameter or in excess of 500 feet of goods more than eight inches in diameter.

"Because of the excellent cooperation of petroleum operators," Deputy Administrator Davies said, "the PAW redistribution program has made it possible to distribute large quantities of surplus critical material to help fill the urgent needs of the industry. The success of the redistribution program and the improvement in the supply of steel now makes it possible to ease further PAW controls.

"Although the supply of steel has improved recently, the demand for tubular goods continues to exceed the supply. The PAW's accelerated drilling program for 1945, calling for a minimum of 27,000 oil and gas wells, makes it necessary for PAW to continue redistribution of surplus tubular goods."

Operators were urged to review their records of tubular stocks in the light of the amendment and to report any changes on Form MA-3A.

Greater freedom to use materials in certain production, transportation and refining operations was granted by PAW November 17 in amendments to PAO 11 and 15 raising from $10,000 to $25,000 the maximum value of materials which may be used without specific PAW authorization.

Maximum Figure Increased

Under an amendment to PAO-11, operators may use up to $25,000 worth of material in pressure maintenance operations, gas cycling, gas treating, in natural gasoline recovery plants and in the construction of natural gas gathering lines without the formality of applying to PAW for authority.

The amendment to PAO-15 permits the use without authorization of a similar maximum value of material for the construction of crude oil gathering lines and other transportation facilities, and for construction purposes in refining operations.

PAW Priority System for Railroad Tank Cars Seen

Establishment by PAW of a priority system for the use of tank cars, under which it would designate who shall ship what, where and when, may be the outgrowth of a critical shortage of rail facilities which last week was the subject of a two-day discussion between ODT officials and its joint tanker advisory committee.

Called to survey the car supply situation, which is growing more acute as a result of expanded programs for the production and shipment of liquids, the meeting was reported to have agreed that there should be a revamping of all ODT orders to provide greater efficiency in both use and movement of tank cars.

More than 12,000 petroleum carriers have been diverted from the East Coast to other services during the past few months and further diversions are in the offing. The need for more cars to move oil to the West Coast for the Pacific war and the conversion of 600 petroleum tank cars for the transportation of sulphuric acid, making the number so converted 1000, are the major factors in the gradual whittling down of the East Coast service.

Because of this situation, it was indicated, it will be necessary to exercise strict control over the cars still left, and it is expected ODT will turn that job over to PAW.

Manpower Needed for Caribbean and Persian Areas as Oil Work Increases

Foreseeing a vast expansion of oil operations in Caribbean and Persian Gulf areas which will continue at least until the end of 1945, PAW last week emphasized the need for increasing technical staffs in those areas but warned interested operators that it would not seek deferment from military service of any men under 26 years of age currently employed in this country whom it is proposed to send abroad unless the circumstances surrounding the case are "extremely unusual."

So far, it was disclosed, only 88 applications have been endorsed by PAW for deferment of young men who already were abroad.

The factors which are increasing the importance of foreign petroleum operations in the war program were enumerated by PAW as including:

1. Gradual improvement in the tanker situation, defeat of the submarine menace and reopening of the Mediterranean route to merchant shipping have made it possible to draw upon foreign oil at a far greater rate than during the early years of the war.

2. The ever-mounting demand of the military and naval authorities for petroleum products can only be met by a constant stepping-up in the rate of foreign operations, since crude oil consumption within the United States has actually been running ahead of production in spite of the fact that substantial amounts of foreign crude are already being imported.

3. The end of hostilities in the European theater will entail no letdown in the rate of foreign operations, but rather the reverse. For with the opening up of full-scale warfare against the Japanese, not only the refineries of the Middle East, but also those in the Caribbean areas will be more advantageously located for military purposes than at the present.

"All of these factors are reflected in the present status and urgency of the foreign construction program," PAW declared. "In the Persian Gulf, an entire new refinery is being built on top priority, solely on the basis of its war-essentiality; but construction activities at this point are only just getting under way. In the same area, one of the most important overseas 100-octane gasoline plants is many months behind its schedule, almost entirely as a result of manpower difficulties. For both of these important projects, wells are also being drilled and pipe lines laid to furnish the crude oil on which they are to run.

"In the Caribbean area, a tremendous development program has been undertaken to effect something like a 50 percent increase in crude oil production during 1944 and 1945. This significant program, which is necessitated entirely by the demands of war, is seriously behind schedule. As for Caribbean refining, as recently as last August the speeding-up of a major construction project was decided on and could only be effected by doubling the previously planned construction forces.

More Manpower Required

"These are only a few outstanding examples of what has still to be done in the foreign field and it must not be forgotten that when all the wells are in production the refineries and 100-octane gasoline plants turning out military products, far greater numbers of skilled operators and maintenance men will be required to run them than were ever before employed at the same locations. In the meantime, until the new projects are completed, current demands of the Army, Navy and Air Force are only being met by overworking the existing wells, pipe lines and plants to the absolute limit, a condition which demands that excessive maintenance work be carried out with minimum loss of operating time."

PAW enumerated some of the special difficulties which prevail in foreign oil activities, pointed out that producing fields and refineries are nearly all located in remote areas where general living conditions are extremely unpleasant and that in the production end, men less than 26 years of age are most frequently to be found in field parties carrying out geological and seismic exploration activiites with crews which are away from their bases in the field for long periods of time. In addition, during wartime it is not possible for the men to take their families with them outside the United States, and for all of these reasons it is exceedingly difficult to persuade the married and older men to accept employment overseas.

"With the critical shortage of technically trained personnel for domestic operations, there is little incentive for them to go," PAW commented. "When the services of a highly skilled technician are lost to one of the companies, there is no local source of obtaining a replacement and much time is lost in sending out another man—if indeed he can be found—from the United States to such a remote location as the Persian Gulf."

Industrial Gas Line to Monterrey Said Planned

Reynosa Pipe Line Company of Texas is reported planning a 14-inch natural gas pipe line from the LaGloria field of Hidalgo County to Monterrey, Mexico. This proposal was placed before the Texas Railroad Commission with the request that all formalities and investigations be waived, but the commission refused to accede. This line would transport 40,000,000 cubic feet of gas daily with an ultimate capacity of 60,000,000 cubic feet.

The Gas Industrial of Monterrey, which comprises a group of industrialists, will be the takers of the gas. This group, it is said, will build the 210-kilometer section of the line from Reynosa to Monterrey, which will include two major and several small river crossings.

A representative of these groups is said to be in Washington negotiating with the Federal Power Commission and the War Production Board to speed necessary approvals and priorities.

Mudd Named President For 1945 of AIMME

Harvey Seeley Mudd, of Los Angeles, president and managing director of Cyprus Mines Corporation, operating on the Island of Cyprus, was elected president of American Institute of Mining and Metallurgical Engineers for 1945. Election is by letter ballot of members, and was announced November 15 by Dr. A. B. Parsons, secretary. Two new vice presidents are Donald H. McLaughlin of Cerro de Pasco Copper Corporation, New York and Leo F. Reinartz, of American Rolling Mill Company, Middletown, Ohio.

Six directors also elected were: C. H. Benedict, Calumet & Hecla Consolidated Copper Company, Lake Linden, Michigan; Robert H. Morris, The Gauley Mountain Coal Company, Ansted, West Virginia; J. C. Nicholls, International Nickel Company of Canada, Toronto; Clyde E. Weed, Anaconda Copper Mining Company, New York; Eugene A. White, American Smelting and Refining Company, Tacoma, Washington; and William Embry Wrather, United States Geological Survey, Washington.

Mudd, the 62nd president of the Institute in the 73 years of its existence, will be formally induced at the annual meeting in New York in February.

Concessions in Venezuela Granted Phillips Company

Concessions totaling 750,000 acres plus three parcels of national reserve leases consisting of an additional 26,000 acres have been granted by the Venezuelan Oil Ministry to the Phillips Petroleum Company, Bartlesville, Oklahoma, according to Frank Phillips, chairman, and K. S. Adams, president of the company. The property is located in the Maturin Basin, considered the most prolific oil bearing region in eastern Venezuela. Two of the exploratory concessions are in the state of Guarico and two in Anzoategui, while the national reserve leases are in Monagas, near the Jusepin, Mulata and Santa Barbara pools. With headquarters already established in Caracas, Phillips plans exploratory operations soon.

Army May Turn White Horse Refinery Over to Interior

Army and Interior Department officials were reported during last week to be engaged in discussions involving future operations of the Canol project.

It is understood the Army is desirous of turning the operation of the White Horse refinery over to some other organization, because of the change in the war picture, and has taken the matter up with interior, which may assume the job.

Special Shawnee Sale

A tract of 76.09 acres on which the Shawnee Indian agency is located, southeast of Shawnee, Pottawatomie County, will be offered at a special oil and gas lease sale December 2, The tract is in two parcels, lot 1 containing 27.89 acres and lot 2, 38.20 acres, in fractional W½ NW 31-10n-4e, near both the Shawnee South and Lake Shawnee pools. The Department of the Interior which authorized the special sale, has a minimum appraisal of $1000 on the agency ground.

PAW Certifications Call for an Increase in December Production

Domestic crude production again will forge ahead next month under PAW certifications calling for a daily average for all petroleum liquids of 5,026,400 barrels.

This will be an increase of 2500 barrels daily over the November certifications and 415,300 barrels daily above actual output in December, 1943, but still some 25,000 barrels short of the all-time high of 5,051,300 barrels certified for last September.

The certifications call for a crude production of 4,722,100 barrels daily, an increase of 1600 barrels over the current allocation, and an estimated 304,300 barrels daily of natural gasoline and condensate, an increase of 900 barrels.

All of the increase in crude output will be centered in five states, with eight maintaining their present production and seven scheduled for less. In the Southwest, producing well over half of the national total, the production rates will be substantially the same as for November, but the situation there was emphasized by Acting Administrator Davies in announcing the figures.

Sweet Crude Needed

"Although the total quantity of crude oil certified for December production has not been changed," Davies said, "it will be necessary that some fields continue to produce in excess of their maximum efficient rates in order to supply programmed requirements for refinery runs within the Southwest district and for necessary movement of crude oil into other areas.

"Moreover, considerable difficulty has been experienced in obtaining sufficient quantities of sweet crude oil to operate the war emergency pipe line at capacity. Therefore, it would be desirable to redistribute allowables among the sweet crude oil fields so that sufficient production from these fields tributary to the Longview terminal of the pipe line would be available to fill adequately the requirements of the line."

PAW's certifications showed that the rate of production in District 1 will drop slightly next month to conform with indicated actual productive capacity, with Pennsylvania dropping from 41,000 to 40,000 barrels, New York from 13,500 to 13,000 barrels, and West Virginia from 8500 to 8400 barrels.

District 2 Increase

District 2 will show a slight increase, due to higher allowables for Kentucky, Nebraska and Oklahoma, it being pointed out that in Kentucky and Oklahoma completion of development wells in recently-discovered fields has afforded additional productive capacity sufficient to more than offset the declining older fields.

Kentucky production is scheduled to increase from 26,000 to 30,000 barrels, Nebraska from 1000 to 1200 barrels and Oklahoma from 345,000 to 350,000 barrels, while Illinois will remain static at 200,000 barrels, Indiana at 13,000 barrels and Kansas at 274,000 barrels, and Michigan will drop from 50,500 to 47,000 barrels and Ohio from 9000 to 8000 barrels.

In District 3, Mississippi is increased from 50,000 to 53,000 barrels, while New Mexico is decreased from 110,000 to 106,000 barrels. the other states remaining unchanged with Arkansas at 78,000 barrels, Louisiana at 350,000 barrels and Texas at 2,133,000 barrels.

In District 4 Colorado is increased from 9000 to 9500 barrels, Montana is reduced from 24,000 to 23,000 barrels and Wyoming left unchanged at 100,000 barrels, while in District 5 California also remains unchanged, at 885,000 barrels.

The production of natural gasoline and condensate is scheduled to increase in eight states, remain constant in six others and drop in only one, California, where 52,000 barrels daily is called for against 52,400 barrels this month.

States to increase their production are: Pennsylvania, 1400 barrels against 1300 barrels; West Virginia, 6800 barrels against 6400 barrels; Illinois, 12,300 barrels against 12,200 barrels; Ohio, 600 barrels against 500 barrels; Oklahoma, 27,000 barrels against 26,900 barrels; Louisiana, 35,300 barrels against 35,000 barrels; New Mexico, 5600 barrels against 5500 barrels, and Wyoming, 3500 barrels against 3400 barrels.

No changes are made in the rates for Kansas, 6000 barrels; Kentucky, 2800 barrels; Michigan, 500 barrels; Arkansas, 5100 barrels, or Montana, 400 barrels.

Crude Oil Production in the United States

(Estimates compiled by The OIL WEEKLY. All figures indicate daily averages, in barrels.)

STATE OR DISTRICT	PRODUCTION IN WEEK ENDED Nov. 18	Nov. 11
Alabama	300	200
Arkansas	80,750	80,500
California	884,600	882,000
Colorado	9,800	9,250
Florida	50	50
Illinois	189,700	204,800
Indiana	13,150	13,300
Kansas	282,700	266,000
Kentucky	30,350	30,850
Louisiana	363,150	364,600
North Louisiana	71,850	73,300
South Louisiana	291,300	291,300
Michigan	50,000	46,550
Mississippi	52,550	51,500
Missouri	100	100
Montana	22,720	22,340
Nebraska	1,000	1,000
New Mexico	105,750	105,750
New York	13,500	13,650
Ohio	7,600	7,700
Oklahoma	358,000	359,400
Pennsylvania	36,750	38,050
Tennessee	35	35
Texas	2,132,300	2,132,350
Upper Gulf Coast	553,350	553,350
East Texas Field	367,950	367,950
Rest of Eastern Texas	144,600	144,600
Lower Gulf Coast	247,600	247,600
Southwest Texas	79,300	79,300
South Central Texas	20,150	20,150
West Texas	473,950	474,000
North Texas	151,200	151,200
Panhandle	94,200	94,200
West Virginia	8,100	8,650
Wyoming	92,150	98,450
Total United States	4,735,105	4,737,075

Texas Allocation by PAW Is Unchanged for December

PAW crude oil allocation for Texas, and for District 3, have been set at the same rate for December as for this month. Texas' quota remains at 2,278,000 barrels of oil daily including 2,133,000 barrels of crude. West Texas District 7C and 8 are assigned 462,000 barrels.

Commenting on the announcement by PAW that the 22,000 barrels required beyond the maximum efficient rate of production, "be allocated to sweet crude fields tributary to the Longview terminal of the war emergency pipe line," Beauford Jester, Chairman of the Texas Railroad Commission is quoted as follows: "The PAW again seems to try and point its finger at the East Texas oil field sweet crude. There was a six-pound drop last month and a similar drop in bottom-hole pressure is anticipated for this month. The commission is going to try and keep the schedule the same as last month and not put on an extra day in East Texas."

Secretary of Interstate Oil Compact Group Named

Earl Foster, attorney for the conservation department of the Oklahoma Corporation Commission, has been named secretary of the Interstate Oil Compact Commission, succeeding E. G. Dahlgren, who retains his post as assistant secretary and full-time secretary of the commission's research and coordinating branch.

Foster will assume his duties December 1. Dahlgren has been acting secretary since the resignation of Charles Orr five months ago. Foster became conservation commission attorney in 1935.

The compact's executive committee accepted the invitation of Gov. Thomas L. Bailey of Mississippi, to hold the commission's next quarterly session at Jackson, December 15-16.

Funds for Exploration in Alaska Asked of Congress

Resumption of congressional activities saw a number of agencies on hand to ask for additional appropriations to carry on various activities, several of them concerned with oil.

The largest request submitted was for $1,075,000 for exploration activities in Alaska designed to provide a local supply and some for export. This appropriation was sought unsuccessfully last spring.

The Navy Department is asking for authority to send $400,000 of an already existing appropriation to buy up lease-hole interest in Naval Reserve 1, which it told Congress cannot be acquired except by purchase or condemnation.

An appropriation of $175,000 has been asked by the Department of Justice, part to be used for carrying out new responsibilities imposed on it by provisions of the Surplus Property Disposal Act, under which it is to pass on sales of government plants to prevent their going to monopolistic interests. The remainder would be used for resumption of antitrust cases which have been suspended during the emergency at the request of the military, among them the "all industry" suit. This seeks, among other things, the dissolution of the American Petroleum Institute.

Change German Industrial Structure To Preserve the Peace, Says Report

Postwar Germany would be barred from any interest whatever in the American oil, rubber or chemical industries under a proposal of a Senate military affairs subcommittee for destruction of the German armament industries and the German cartel system under which Nazi industrialists, before the war, were able through patents to control the supply of many commodities.

Months of investigation by the subcommittee developed that German interests had penetrated into every important industry in this country, exerting their influence to so direct activities as not to impede Nazi preparations for war and conquest; a list of American companies reported in 1937 as having agreements with I. G. Farbenindustrie covered more than a score of industries, and included such concerns as the Ethyl Gasoline Corporation, General Tire and Rubber Company, Goodyear Tire and Rubber Company, Jasco, Inc., Standard Oil Development Company, Standard Oil Groups and Standard Oil Company (Indiana).

The subcommittee pointed out that following the last war, defeated Germany was enabled to stage the comeback which paved the way for the current war through the stranglehold upon many industries outside of Germany through its cartel system, and declared that Germany's industrial structure must be reorganized so as to eliminate its aggressive power if peace is to be preserved.

Retain Markets During War

The report contends that even during the war, German industries have sought to retain and expand their markets, particularly in Latin America where German steel interests "have been successful in preserving German supremacy in the steadily expanding South American market."

"The German aggressors have begun to pursue a strategy which they found successful a quarter century ago," it was declared. "They are already deploying their economic reserves throughout the world in preparation for a third attempt at world domination. They plan to resume the old commercial pattern which served them so well. We must insure that in the defeat of Germany the economic forces of aggression will be forever eliminated along with the military forces."

The elimination of restrictions on production, high prices, and exclusive market policies from the international field will not only help to preserve the peace but will assist in refocussing domestic production on maximum output, lowest price, and highest quality, it was stated, thus providing "a sound basis for the flourishing of competitive private enterprise, not only in harmonious international trade but also in expanded domestic and foreign markets."

International Economic Control

To eliminate risk of another war the United Nations must destroy Germany's industrial leadership as well as its military leaders, the subcommittee held. To accomplish this, an international authority should take over the economic controls formerly held by Nazi cartelists and destroy the cartel system in Germany, and liquidate the German armament industry, both direct and indirect.

The subcommittee favored the idea embodied in the Anglo-American oil agreement of international arrangements to provide for the freest possible movement of goods, and emphasized that the United States, because of its advanced industrial position, should take a leading part in the development of such plans, with no government invasion of private competitive business except only where private competitive alternatives have been exhausted.

To facilitate United States participation in international organization, the subcommittee recommended creation of a joint legislative-executive commission; negotiations with foreign countries should be conducted by the executive branch of the government, but the legislative branch must eventually sanction any international agreements arrived at by authorizing domestic enabling machinery and by appropriating funds necessary for American participation. Representatives of affected industries should be invited to participate in the deliberations of the joint commission, it was stated.

As final steps toward a cartel-less economy, the subcommittee recommended amendment of our patent laws to require that any discovery originated abroad be licensed to any American producer who wishes to use it on a non-exclusive basis for payment of a reasonable royalty.

To clear the way for the new set-up, the report urged that all enemy-owned property in this country seized by the Alien Property Custodian, other than patents, be sold and the proceeds used to defray part of our war cost, and that enemy-originated patents should remain the property of the Federal Government and be made available to all American industry through a system of general licensing.

America Must Supply Refinery Replacements

The Foreign Economic Administration is interested in the oil industry and already has representatives abroad looking into the needs of the liberated countries for equipment with which to revive their refinery and other operations.

Indications are that Allied bombing of oil plants as part of the plan to knock Germany out of the war by attacking its industrial facilities will result in heavy requirements of American equipment to rebuild refineries in all of the European countries, and this will be one of the first steps necessary in the program to put the liberated areas on their own feet again.

Well Status Report Is Ordered for East Texas

A well status report for the entire East Texas oil field has been ordered by the Texas Railroad Commission. Reports are to be filed with the commission by January 1, 1945.

OPA Adds 26 Stripper-Well Pools to Subsidy List

Twenty-six stripper-well pools in Illinois, Indiana, Kansas, New Mexico, Oklahoma, Texas and Wyoming were added to the subsidy list by OPA November 16, with premiums payable from November 1.

The great majority of the pools will take the top 35-cent rate, as shown in the following table:

Illinois—Waggoner pool, Montgomery County, and Raymond pool, Montgomery County, 35 cents per barrel.

Indiana—Prairie Pool, Posey County, 25 cents per barrel.

Kansas—Baldwin pool, Douglass County; De Moss, Butler; Soeken, Rice; Iuka-Arbuckle, Pratt; all pools, Elk (east half); Kuske, Sedgwick, all 35 cents; Ponce, Rice, 25 cents; Cross, Sedgwick, Bird, and Barton, 20 cents.

New Mexico—Leo pool, Eddy County, 25 cents.

Oklahoma—March pool (Layton-Skinner), Payne County; Wewoka (Hunton Lime), Seminole; Tull, Creek; Candy Creek South, Osage; Kasishke South, Osage; Price, Pawnee; Breene, Osage, and Piggot, Osage, all 35 cents; Cromwell (Gilcrease), Seminole, and Long, Hughes, 25 cents.

Texas—Blackwell pool, Coke County, 25 cents.

Wyoming—Pilot Butte pool (Upper light oil), Fremont County, and Greybull, Big Horn, 35 cents; Salt Creek (First, second and third Wall Creek Shale), Natrona, 20 cents.

OPA also announced revision of premiums previously granted to four areas, one of them involving the Salt Creek field in Wyoming, where the First Wall Creek and Shale areas, formerly allowed 35 cents per barrel, are reduced to 20 cents per barrel, and the Second and Third Wall Creeks are brought into the subsidy with a 20-cent premium. The Morrison pool, where only one well is involved, is left at 25 cents a barrel.

Other changes involve the Piggot pool in Oklahoma, where the rate is changed from 25 to 35 cents, and the Blackwell pool of Texas, increased from 20 to 25 cents. All of the current rates on these pools are incorporated in the list above.

Infringement of Patent Arguments Are Delayed

The Supreme Court last week deferred until February the hearing of arguments on the suit brought by the Dow Chemical Company against the Halliburton Oil Well Cementing Company, charging infringement of patent.

Two conflicting circuit court decisions have been rendered on the patent, covering the treatment of wells to increase recovery, the present case being appealed from a decision of the Sixth Circuit Court of Appeals affirming a district court finding holding the patent invalid for lack of invention.

A Tenth Circuit decision held the patent valid by reason of the use of an inhibiting agent to prevent damage from acid to metal surfaces, without which the acid was a failure.

The Sixth Circuit concluded that the addition of a corrosion inhibitor to hydrochloric acid for use in acidizing wells to reduce corrosion required nothing more than ordinary skill and did not involve patentable invention.

Tax Review

A New Feature of The Oil Weekly

By WILLIAM O. TAYLOR*

IT IS the purpose of this column (which appears here for the first time) to review legislation, judicial decisions, administrative rulings and policies, and topics which are of current interest to the oil industry from a tax viewpoint. It will be published as frequently as new developments seem to require.—*Editor.*

Decision Holding Oil and Gas Leases Not Capital Assets Allowed To Stand

THE Supreme Court has refused to review the decision of the Fifth Circuit Court in *Greene v. Commissioner*, 141 F(2d.) 645. That case affirmed a decision of the tax court that certain oil and gas leases sold by the taxpayer in 1938 and 1939 were not capital assets, with the result that gains resulting from such sales were fully taxable. If the leases had been treated as capital assets, only part of the gain (depending on how long the leases had been held) would have been taxable in the case of those leases which had been held for eighteen months or longer. The tax court's decision was based on its determination that 1) the taxpayer's activities in buying and selling undeveloped leases constituted a "trade or business," and 2) that the leases sold in 1938 and 1939 were held by the taxpayer "primarily for sale to customers in the ordinary course" of that trade or business.

Although there have been substantial changes in the law with respect to capital gains and losses, the same result would be reached under the law as it exists today. It is true that the revenue act of 1942 changed the definition of "capital asset" so that that phrase no longer includes real property used in a trade or business. And a recent government ruling *(I.T. 3693)* holds that oil and gas leases constitute real property for federal income tax purposes regardless of whether they are classed as real property or personal property under applicable state law. However, the ruling distinguishes between real property *used* in a trade or business and that which is *held primarily for sale to customers in the ordinary course* of a trade or business, a distinction apparently justified by Section 117 (j) (1) of the Internal Revenue Code.

The phrase "trade or business" usually connotes an activity in which the transactions are, in some measure, continuous or recurring. The Greene case would not necessarily apply if one's purchases and sales of leases were very infrequent.

If Greene had retained an overriding royalty, the question involved in the above case would, of course, never have arisen. Under such circumstances, it has been held that the transaction is in the nature of a sub-lease rather than a sale. Therefore, any cash received by an assignor who retains an override is treated as ordinary income, subject to a depletion allowance, rather than proceeds of sale.

* * *

Gains and Losses on Sales of Leases Will Be Treated as Capital Gains and Losses Under Certain Circumstances

I.T. 3693, the ruling referred to above, has answered a question which has existed for some time in the minds of many who are concerned with tax problems of the oil industry. Although the revenue act of 1942 changed the definition of "capital" asset so that it does not include real property used in a trade or business, it also provided that under certain circumstances gains from the sale of such property will be treated exactly as gains from the sale of capital assets. This may be advantageous for one or more of these reasons: 1) the amount subject to tax is less; 2) the rate of tax may be less, due to the alternative calculation, or 3) the capital gain may offset a capital loss which, standing alone, would be deductible only to the extent of $1000 in the case of an individual and not deductible at all in the case of a corporation. Inasmuch as mineral leases are considered real property in some states and personal property in others, there has been some doubt as to the status of leases under the above provision. Under *I.T. 3693*, they will all be treated as real property, regardless of state law. And they will be considered as *used in a trade or business* regardless of whether they are developed or undeveloped when sold, *provided they were originally acquired for purpose of development rather than re-sale.* Proving the purpose for which a lease was acquired is another matter, and the ruling doesn't throw much light on that problem.

However, if it can be shown that the leases were not acquired principally for re-sale, then the rule applies as follows: There are grouped together all gains and losses from sales of leases and depreciable equipment and gains and losses from *involuntary conversion* (e.g., theft, fire loss, condemnation) of capital assets or other property used in a trade or business, provided in each case the property sold or involuntarily converted had been held more than six months. If the gains exceed the losses, then all of them (both gains and losses) are treated as capital gains and losses, with possible tax advantages pointed out above; but if the losses exceed the gains, then all of them are treated as ordinary gains and losses, fully taxable or fully deductible as the case may be.

Profits and Loss

Suppose A has had a $10,000 loss during the year due to worthless stock. This is treated as a capital loss and, standing alone, is deductible only to the extent of $1000. However, he has two leases, each of which he can sell for $10,000 profit. If only one of them has been held for more than six months, A has no choice but to sell the older. His gain on the lease sale may be entirely offset by the loss on the worthless stock, so that he gets full benefit of the latter rather than only a $1000 deduction. But if lightning strikes one of his wells the next day causing a $12,000 loss (involuntary conversion), A is back where he started for when the $10,000 profit on the lease sale is grouped with the $12,000 loss due to lightning, the losses exceed the gains and *both* are treated as ordinary items rather than capital items. The loss from the stock may not then be offset against the gain on the lease sale.

The above provision offers opportunity of astute tax planning in connection with lease or equipment sales, and especially so in view of the fact that an assignment in which an override is retained is not treated as a sale of the lease for tax purposes.

No Chance Seen for Early Change in Federal Taxes

Congressional leaders returning to Washington for the final meetings of the current session revealed last week that there is little hope for tax reductions on 1945 income.

Chairman George of the Senate finance committee and chairman Doughton of the House ways and means committee agreed that prolongation of the war in Europe has foreclosed any chances of tax reductions in the near future. They indicated that income and corporation rates would remain at their current level throughout the next year, at least.

The best that can be expected under present conditions, Doughton said, is preparation of plans for a postwar federal tax program to be put into effect at the earliest opportunity.

At the opening of the session, Senator Vandenburg of Michigan introduced legislation to block the increase of social security payroll taxes from 1 to 2 percent scheduled to take effect January 1. Vandenburg has been successful in retaining the 1 percent rate for the past three years on a showing that the social security fund already is larger than required.

On November 16 Speaker Sam Rayburn said he thought the increase likely would go into effect.

As House and Senate convened there were indications that the final days of the session will see little legislation enacted beyond "must" measures, including extension of the second war powers act, providing authority for priorities and allocations, which expires at the end of the year.

Columbia Gas to Eliminate $54,000,000 of Write-Ups

The Federal Power Commission last week approved proposals of subsidiaries of the Columbia Gas and Electric Corporation to eliminate nearly $54,000,000 of write-ups and other excess of book cost over actual legitimate cost of properties from their accounts.

United Fuel Gas Corporation will eliminate from its gas plant accounts a total of $41,825,648, while Warfield Natural Gas Company will write down $85,711, Huntington Development and Gas Company $5,950,976, and Cincinnati Gas Transportation Company $5,930,466.

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British Also Hit Oil Pact

Press reviews declare agreement difficult to interpret and a model for other commodities

By A. R. McTEE, Staff Writer

A REVIEW of opinion in Great Britain indicates as much uncertainty and confusion on the pending Anglo-American oil agreement as has become apparent in this country. The English press has issued a few lengthy criticisms, including much questioning of what is implied by the document. "We are not given enough facts to decide these questions," says the Manchester *Guardian,* one of England's leading newspapers, and adds this piquant observation: "But the impression of an American steamroller victory is hard to avoid."

A man-sized punch was directed at the agreement by *The Economist,* a London magazine. In a detailed attempt at dissection, this publication said of the agreement: "It completely defies interpretation or, rather, it offers too wide a choice of interpretation to make any interpretation possible." With an equally emphatic blast, the same magazine concedes that "If the art of diplomacy consists in disguising intentions, then the Anglo-American agreement is a masterly document."

On the difficulty of interpretation charge made by *The Economist, The Petroleum Times,* England's chief publication devoted to oil, comments: "Whether this is a fair conclusion readers must decide for themselves: there is certainly something to be said for its justification. Its indefiniteness may well be intentional and because no other line of approach was possible at this stage. Acceptance of principles and a sincere belief in the determination that the eventual operational details would be made to accord with these principles by adherents to the agreement may well have been considered the primary requisites."

All Too Vague

Directing its criticism to specific provisions of the agreement, *The Economist* stresses three: "First, the British and American governments are to respect the principle of equal opportunity in the acquisition of exploration and development of rights in areas not now under concession. The countries in which Britain and America are to enjoy equal opportunity are not defined; on one interpretation the area of equal opportunity seems to be outside the United States and countries outside its jurisdiction, as well as outside the Colonial Empire. If this interpretation is correct, the agreement accepts an important principle by treating Britain and the British Colonial Empire as a unit. The definition of equal opportunity has not been attempted.

"Second, the clause in the agreement about the supplies of oil to be derived from various producing countries, and their relation to national reserves and national interests, requires a great deal more elucidation. The prospect after the war is not one of oil shortage, but a tendency to overproduction that may tend to depress prices. In order to avoid a glut and falling prices, the intention may be to prepare for a production, marketing, and possibly price control agreement; if a cartel of this sort can be justified, on what basis are production and marketing quotas to be allocated? And where do Russia and Holland stand in this matter?

"Third, the agreement provides that the construction and operation of refineries shall not be hampered by restrictions imposed by either government or by its nationals. The distribution of refineries is no less important than the control of crude oil resources, but hitherto, Britain has imported the bulk of its oil in the finished form. Since for a variety of reasons, it may be desirable for Britain to engage in the process of refining, will this country have the right, under the agreement, to establish refineries, even if this would involve, as in the United States, the imposition of a tariff on refined products?"

International Aspect

Petroleum, a monthly magazine, criticized the short notice of termination of the agreement, in the September issue. Commenting further, the October number continues: "There are two further points not mentioned in the daily press upon which we feel comment is desirable. The first concerns the creation of an International Petroleum Commission, provided for in Article III, in addition to the Permanent International Petroleum Council to which Article II refers. The inclusion of the word 'International' in the name of this Commission seems to be justified more by its aims than by its composition.

"The second point calling for comment is the limitation of this agreement to 'crude petroleum and its derivatives.' The wide interchangeability of coal and crude petroleum as a fuel, a source of liquid fuel and oils, and a starting material for chemicals, as well as the possibility of extracting liquid fuel and oils from solid materials such as oil shale, lignite, tarsands and the like, seem to demand categorically that all sources of fuel, fuel-derived chemicals, etc., should, at least up to a point, be dealt with in one and the same agreement. Otherwise it is very probable that the aims of this agreement in its present form will be endangered by quite legal actions."

Inquiring into actual spheres of influence, *Petroleum* also asks: "Another question arising concerns the exploitation of the Arabian fields. Is it to be left to a couple of companies which, for a song, secured the concession rights over the whole area?"

Anticipating technological difficulties arising from interpretation of the agreement, *Petroleum* also puts this query: "In the case of patents, nearly all the relevant ones are in American hands. On what conditions, if any, will they be made available to the British industry?"

If these points should not find due consideration in future consideration and application "in the proposed multilateral agreement, inconveniences or even new disasters may result," observes *Petroleum.*

In the over-all picture, the British press as a whole "viewed the agreement with satisfaction, and as a genuine effort to implement the principles of the Atlantic Charter by regulating the supply of a vital world commodity," says *Petroleum.* "It was hoped that governmental regulation of the crude-oil production of the U. S. and the British Empire representing 70 percent of world production, would be a powerful weapon for the preservation of world peace.

"Doubts were expressed in some quarters," continues this summary, "as to the extent to which the oil companies would be prepared to accept the assessment and regulation of world demand by the Oil Commission, the familiar criticism of bureaucratic control being expected. The extent to which the oil companies would follow the recommendations of the Oil Commission was felt to be the real test of the agreement.

"Synthetic-oil production, which at least in Germany had reached very high figures, would, it is felt, have to be considered when assessing world oil production.

"The oil agreement is expected to be the forerunner of agreements on similar lines for other vital commodities, such as rubber, cotton, wheat and tin, and talks between the countries most involved are foreseen.

"For the successful negotiation of a multilateral agreement, the concurrence of the following oil-producing countries is considered essential: U.S.S.R., Iran, Iraq, Rumania, Venezuela, Colombia, Mexico, and the Dutch colonies. Other countries, such as Austria and Hungary, which most probably will have an exportable surplus of oil, will also have to be included in such an agreement, which in order to stabilize the world markets must include all countries which consume substantially less than they produce."

Petroleum Times, in noting the various British reactions to the agreement, says that "while holding no briefs for the 'major' interests, it is difficult to understand why those who champion a planned economy—national and international—should repudiate on principle, the *one* serious attempt at economic cooperation developed so far. . . . International cartels—and incidentally domestic combines—may be pernicious, but that does not mean that Britain can afford to discard altogether a form of industrial organization which in the past has worked."

'Model Agreement'

The *London Times* observes that the Anglo-American agreement, "sets, and is intended to set a model for international agreements on other commodities."

Planned economy, national and international, is not a universally accepted doctrine in the United States. In fact, the ideal here is for a minimum of planning, if by planning is meant control by government. Thus, either those responsible for the Anglo-American agreement in this country, are approaching the problem with a totally different fundamental viewpoint from that of their British colleagues, or *The Economist* has hit the nail on the head in characterizing the document as a "masterpiece" when it comes to disguising intentions.

Restoration and Continuance of Free Interplay Of Economic Forces Needed

Industry requires the prompt lifting of controls after war in order to avoid the effects, termed enervating and inhibiting, which would follow the effort of central government agency arbitrarily to control commerce. Oil and gas should be allowed to "spread their wings"

By JOHN D. GILL
Director, The Atlantic Refining Company

JOHN D. GILL, economist, and director of The Atlantic Refining Company, Philadelphia, asserts that the oil and gas industries, as well as other lines of industry, will be seriously handicapped in their efforts to serve the nation after the war unless there is prompt restoration and continuance of the free interplay of economic forces and competition.

Such freedom of competition, made possible by a minimum of government-agency "economic planning," will be the only guarantee against industrial stagnation, high costs and prices, and restricted standards of living, he believes.

However, he points ont, there is evidence that there will be determined, although perhaps circuitous, efforts to saddle upon the nation some of the war time controls, and furthermore, to assume new controls. Contemplated brain-trust shaping of the development and use of natural gas is cited as an example of the economic planning already under study.

"The Federal Power Commission may think it knows better than anyone else how to utilize the natural gas resource," Gill declares, but "The chances are very great that it does not; that it cannot foresee the avails and costs of fuels of various sorts or the needs for them down through the decades and generations still ahead."

The warning against extension or enlargement of controls was voiced by Gill in an address on "Impacts of the War on the Petroleum Industry," before the Ohio Petroleum Marketers Association, Columbus, Ohio, October 26, 1944. The paper is published here in abridged form.

PRICE control, control over foreign markets, stimulation of overseas production of crude oil, control of development of domestic crude oil reserves, and control over the processes of distribution may set up repercussions that will be felt long after the end of hostilities. This far-reaching control over economic processes is the impact of the war which offers the greatest threat to the high efficiency, expanding volume of operations, and financial welfare of units in all divisions of the petroleum industry.

Arbitrary control of business procedures, no matter how seemingly necessary and useful in wartime, is an uneconomic practice, hindering normal and natural production and distribution. Such objectionable control is to be distinguished from the influence which government exerts practically to protect the obvious rights of one individual or business entity against the aggressions of another, as in control of vehicular traffic at a highway intersection. Arbitrary economic control has no valid place in our peacetime economy.

Because control is the chief impact of the war, because of the threat and implications of its continuance—implications which reach deeply into your business, self-interest demands that it be examined closely. Perspective may be gained by consideration of the controls which are contemplated by the Federal Power Commission over the natural gas industry, suggested by the recent order of the commission for a probe of that industry.

The natural gas act contains what may appear to be an innocuous provision empowering the Federal Power Commission to give consideration in pipe line certificate cases to the social and economic effects of the use of natural gas on competing fuels. Apparently, the commission interprets this provision as justifying the prevention of construction of interstate natural gas pipe lines if the result of their use would affect adversely the interests of competing fuels, established transportation systems, and related interests.

Moreover, the commission, as judged by statements in its 1940 report, has its own ideas of principles of conservation and of the ways in which natural gas should be used. In that report it stated that the *". . . general use of natural gas under boilers for the production of steam is . . . under most circumstances of very questionable social economy."*

In the same report it expressed what appears to be at least a tentative opinion when it said, *"A careful study of the entire problem may lead to the conclusion that use of natural gas should be restricted by functions rather than by areas."*

This, presumably, would provide for the use of natural gas as a chemical raw material, or perhaps in internal combustion engines at any distance from its source, but would prohibit its use as fuel under steam boilers even in close proximity to its source.

In any event, regardless of the opposition of the Department of the Interior and the National Conference of Petroleum Regulatory Authorities the Federal Power Commission has announced its order instituting a thorough-going investigation of the natural gas industry. Of itself, an investigation for facts can do no harm; rather, it should add to our store of knowledge, the increment of which may be worth more than the cost of the investigation.

But an investigation in the interest of a predetermined course of co-ordination of economic activities is an entirely different matter. It may prove to be another case of the stagnating effects of well-intentioned but unreasonable zeal for co-ordination and conservation. Moreover, it seems to convey the idea that the commission thinks the development of natural gas should proceed with regard, not to the general interest, but to special interests. If the results of the study are applied as indicated, the Federal Power Commission will become a more potent dictator over a limited, but important area of the economy.

Superior vs Inferior Uses

Several years ago in government circles a somewhat similar hue and cry was raised against the use of heavy fuel oil under boilers. There was much ado about the "superior and inferior uses of petroleum." The use of fuel oil for steam

generation was deprecated by men who during the present war have ordered its production in larger, uneconomic quantities at the expense of "superior" products.

That battle over "superior and inferior" uses was rhetorical. Sound economic practice won out. The production and use of residual fuel oil proceeded in accordance with the complicated interplay of several factors, including the estimated proven and forecasted reserves of crude oil, the current and forecasted cost of production, the investment required in and cost to operate refinery equipment for the conversion of residual fuel oil to "superior" products, and the cost of competing fuels for use on land and sea. It is lucky that during the war America had a large supply of heavy fuel oil for the operation of our enlarged navy, our merchant marine and many of our essential industries. The earlier battle was rhetorical, but the forthcoming one may be more than rhetorical, because the commission is implemented with the power to control, through its power to issue certificates.

The Federal Power Commission may think it knows better than anyone else how to utilize the natural gas resource. The chances are great that it does not, that it cannot foresee the avails and costs of fuels of various sorts or the needs for them down through the decades and generations still ahead. So far as we have knowledge, natural gas is essentially a fuel, to be burned to best advantage, whether in internal combustion engines or under boilers. A small portion of it has been used advantageously for other purposes, for example, the tiny helium fraction of a limited reserve for inflating lighter-than-air ships; a larger fraction has been used to produce carbon black, a utilization of natural gas once condemned, but thoroughly justified by the quality of carbon black produced and the great intrinsic value of carbon black in prolonging the life of vehicular tires; and a small fraction has been used in the chemical arts.

As Raw Material

But because of its very high methane content, most of our natural gas is chemically refractory. It may be many years before our industry will be able to utilize natural gas in a big way for the production of liquid internal combustion engine fuel. Moreover, the superabundant availability of natural gas as a chemical raw material enormously overshadows the market potentialities for chemical products that might be made from it; in just the same way that the superabundance of coal as a chemical raw material vastly overshadows the market for chemical products derivable from by-product processing of it. Less than one sixth of our annual production of bituminous coal is processed, and that sixth largely for its coke content. Many of the chemical raw materials made available by coking are not further utilized by the chemical industry but instead find "inferior" uses.

The known reserves of natural gas are enormous. Perhaps the commission overlooks this fact. According to accepted appraisals the calorific value of the known, net recoverable reserves of natural gas is equal to the calorific value of the estimated known net recoverable reserves of crude petroleum. Moreover, it is reasonable to expect that great quantities of gas are yet to be discovered. If Wallace Pratt's statement, now generally accepted, namely, that there is more oil yet to be found in the country than has already been found, is valid, there is a strong basis for belief that proportionately large reserves of natural gas await discovery. But suppose such a possibility were not realized. Suppose that the gas in sight were nearly all the gas we are to have. There is still no good reason for arbitrary control over the future development and use of it.

Strict Economic Development

Up to the recent past the development of the natural gas industry has taken place along economic lines. Risk takers built gas pipe lines to markets when they thought they saw enough gas reserves to justify the necessarily large investment in the gathering and transportation system. When the reserves were deemed inadequate, or when they were unknown, there was no wasteful investment in transportation lines. The knowledge of gas reserves and their operating characteristics is now sufficiently well established to enable entrepreneurs to plan wisely for the utilization of them. If natural gas development is permitted to take place in a strictly economic way, that is, according to competitive practice, the country may be interwoven with a useful system of gas pipe lines. Of course, owners of competing fuels and of the transportation systems carrying competing fuels may remonstrate. That is a situation that develops in all inter-industry competition. Regardless, the general interest would be advanced by giving the gas industry its head. It would insure that less of the nation's total energy was used to perform a given job than would be the case if the commission were to seek and obtain congressional legislation forcing continuance of the status quo upon the economy.

"Spread Their Wings"

The competing natural resources—gas, petroleum and coal—should have the opportunity to spread their wings just as competing transportation media—tankers, railroads, trucks, buses, airplanes—should have.

The widespread use of natural gas under boilers and otherwise is a labor-saving device which would advance our country industrially and raise our standard of living. About half the total gas produced is derived from the production of crude oil. When the gas is marketed, it benefits the public in two ways: first, directly, through the labor-saving utilization of this excellent fuel; and, secondly, indirectly, by providing the petroleum industry with an additional source of revenue, which benefits the public by lowering the prices of all petroleum products. When the gas is not utilized, the industry's revenue from petroleum products alone must be equal approximately to what could have been realized from liuqid products and gas together. The utilization of gas increases intra-industry competition and reduces prices.

To illustrate the benefits of freedom of action on the one hand and the stagnating effect of the co-ordinating control which is implied in the commission's statements on the other, there should be considered one more aspect of the threatened control, namely, that implied in the commission's statement that the "use of natural gas should be restricted by functions rather than by areas." The subject is complicated, and there is the danger of over-simplification. But I have so much more confidence in the economic sense of many independent competing business managements than I have in the judgments of any governmental agency that I am willing to believe that it might be better for the entire economy to have large quantities of natural gas burned under boilers in close proximity to the gas source, if the business managements so planned it, and spent their capital funds for it, than it would be to withhold the gas from all use for an untold number of years, or to transport the gas, at considerable cost, to distant points for the purpose of using it in some commission-approved manner. It might be profitable also to transport the gas over considerable distances in lines of appropriate size and capacity for any competitive use despite the commission's ideas regarding coordination of the activities of the country's several fuel and transportation industries.

Arbitrary Acts Impede

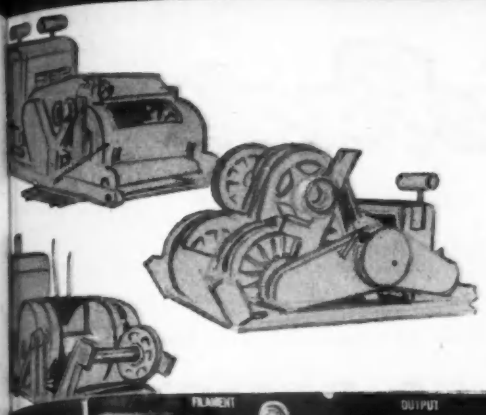
Quick, arbitrary coordination of the parts of the economy has unquestioned merit in times of national emergency when our country is threatened by forces originating beyond its borders, and when security, rather than growth of the stadnard of living, is the prime necessity. But arbitrary coordination of economic affairs in peacetime is a different matter. It impedes rather than promotes progress toward the objective. It is an enervating and inhibiting process.

Whether coordination is wise and helpful or unwise and hurtful depends upon the conditions under which it is practiced. Unfortunately, this fact seems too little understood. When team work is a necessity in the functioning of the parts of the organization, cordination is indispensable. This is easy enough to see in the physiological field. The functioning of the eye and the hand must be well coordinated through the brain in many human activities. Here cooperation, not competition is requisite. But to attempt to coordinate the brain, the eye and the hand of each of several players in a billiard game would be to kill competition and spoil the game.

Competition between, and arbitrary coordination of the elements of an organism, whether in a physiological entity, in a corporate entity, or in the national economy cannot proceed simultaneously. As of any interval of time, they are incompatible. If we need and would use one mechanism, we must forego use of the other. In economic affairs, to reap the benefits accruing from competition, the enervating and inhibiting effects of arbitrary coordination must be avoided.

The efforts of some central government agency arbitrarily to coordinate the work of major industries is an enervating and an inhibiting process, which so far as anyone knows, in peacetime can result only in the slowing down of the rate of growth of our material welfare. This is what I meant when I spoke of the stagnating effect of control.

In peacetime, I think, control is to be resisted by business men everywhere, even by those who temporarily might benefit from it, because once the principle of contorl is approved and adopted, there is no assurance that it will not strike adversely those it has once favored, as well as all others.



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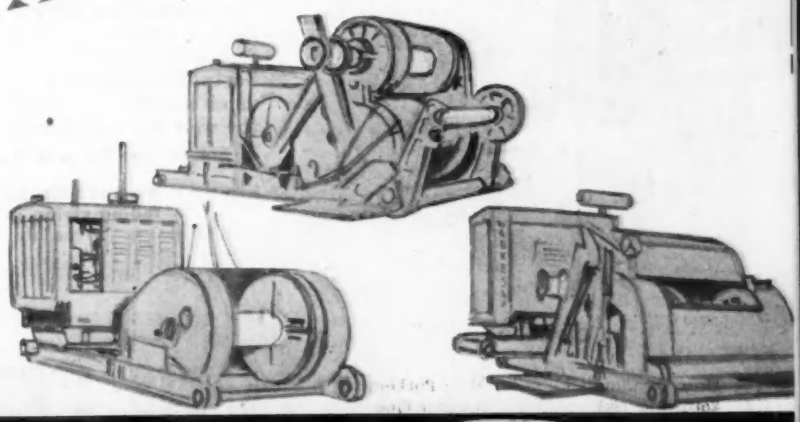

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Sub-Surface Facts

ON THE CONTROL OF FLOWING WELLS

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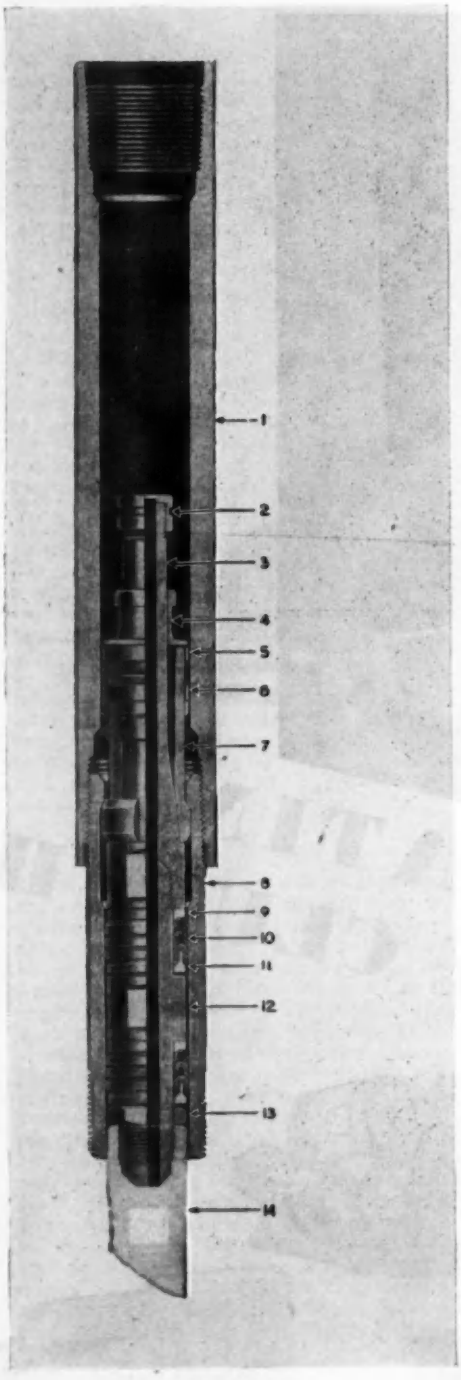

LEGEND

1. Flow Coupling
2. Retaining Nut
3. Lock Mandrel
4. Slip Carrier
5. Slip Carrier Band
6. Mandrel Band
7. Slips
8. Landing Nipple
9. Male Packing Adapter Ring
10. Packing
11. Female Packing Adapter Ring
12. Packing Mandrel
13. Packing Mandrel Nut
14. Sub-Surface Control

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The new Otis Type EB Choke represents the latest design in subsurface pressure control and provides an easily removable, yet most positive, lock and packoff assembly for subsurface regulators, chokes, plugs, safety valves, etc. The original purpose of the tool was primarily to withstand extremely high subsurface temperatures and pressures; however, the fact that it is simple to run and pull, plus additional features, makes it most desirable for any removable subsurface control installation. This too, like all other Otis subsurface tools, is run and pulled under pressure on an ordinary steel measuring line.

The Type EB Choke differs from the regular Type B Choke in that it is necessary to have a Type EB Landing Nipple in the tubing string for the EB Choke to seat in. It will not seat elsewhere; consequently, the choke has only one fixed depth at which it will set. It is necessary, of course, that the Landing Nipple be installed in the tubing string at the time the well is tubed. Because the bore of the Landing Nipple is slightly restricted, it is important that it be placed below the maximum anticipated swabbing depth. Bottom hole pressure bombs, samplers, etc., can, however, be run through the Landing Nipple without trouble.

THE PRINCIPAL ADVANTAGES OF THE EB CHOKE ARE AS FOLLOWS:

1. ***Heat Resistant Packing Element***—The slightly restricted Landing Nipple makes possible the use of the new asbestos-base heat-resistant packing now used so successfully on the Otis Side Door Choke. This packing easily withstands the highest subsurface temperatures and pressures and is inert to acids, alkalis and sour crudes.

2. ***Unnecessary to Flow Well to Set Packing***—The packing fits snugly in the restricted nipple; therefore, it is not necessary to flow the well hard to cause the initial shutoff. This is particularly important where there is danger of pulling sand into the tubing string by flowing the well at an excessive rate.

3. ***Simple to Run and Pull***—Because the O. D. of the Type EB Choke is smaller than the regular Type B, the new tool is easier to run and pull through crooked tubing, paraffin deposition, etc. The setting and pulling operation is simpler and the preset packing always assures a positive shutoff regardless of the pressures encountered.

4. ***Flow Coupling***—A special flow coupling, much heavier and longer than standard couplings, is used immediately above the Landing Nipple to reduce the possibility of abrasive flow cutting through the tubing.

5. ***Positive Lock***—The lock employed on this tool is the same as that used so successfully on over 1200 Otis Side Door Choke installations.

We recommend the installation of an EB Landing Nipple with the tubing string in every well in which there exists the possibility that the use of subsurface controls may be advisable.

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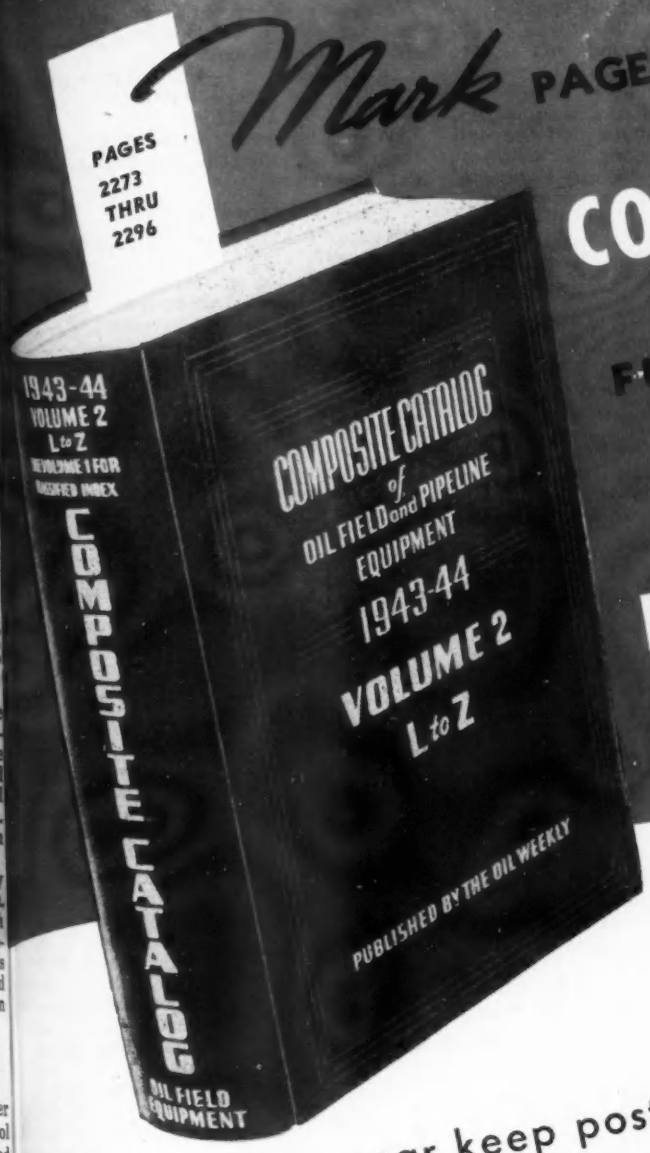

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Behavior, Limitations of

Tubing and Drill Pipe In Tension

By JOE L. WARD, JR.

BEHAVIOR of drill pipe and tubing in tension is a practical subject of which many men in the operating end of the industry are woefully ignorant. The limitations which should be placed on pipe in tension should be familiar to all drillers and fishing-tool men as well as tool pushers and engineers, and yet the stock solution in the majority of instances to this problem is "pull the weight of the pipe." This rule of thumb has resulted in more than one junked hole.

This article will attempt to present as simply as possible the manner in which steel fails and the few simple fundamental laws of strength of materials on which the entire subject is founded. In addition, the various formulae are developed from which can be calculated the tensional properties of pipe in the absence of suitable tables containing the desired information, and such a table for both drill pipe and tubing is included.

Within the range of loads to which tubing and drill pipe should be, but are frequently not, limited, the steel of which the pipe is composed is an elastic material, and its behavior is analogous to a rubber band or a coiled door spring—i.e., for each equal amount of pull applied to a joint of pipe its length increases by an equal amount, but when the load is removed the pipe returns to its original length. However, at a certain point of loading the proportion between increase in load and increase in length ceases, and at a relatively slightly greater load the pipe becomes permanently deformed and will no longer return to its original dimensions when the load is removed. The point at which the constant relationship between load and deformation ceases is known as the "elastic limit" and the point at which permanent deformation occurs is called the "yield point." Both of these terms are expressed in unit load as hereinafter explained in conjunction with the simple laws governing the performance of steel within the elastic range.

Unit Load

When a load is applied in tension to a steel member, whether it be bar, pipe, or rod, the entire load is evenly distributed over the cross sectional area of the member, and each unit area of the member bears its proportional share of the load. Thus the so-called fibre stress or, as herein designated, unit load is the total applied load divided by the cross sectional area, the units for our purposes being pounds and square inches, respectively, the unit load being pounds of load applied per square inch of area:

$$S = P/A \qquad (1)$$

S = unit load in pounds per square inch.
P = total applied load in pounds.
A = cross sectional area in sq. inches.

When a load is applied and the unit load is developed, the original length of the member (before the application of the load) is increased by an amount proportional to the unit load. The total stretch divided by the original length of the member gives the unit stretch (technically known as strain) of the member. Thus

$$d = e/L.$$

d = unit stretch in feet per foot.
e = total stretch in feet.
L = original length in feet.

In that until the elastic limit is reached the unit stretch is proportional to the unit load, then the ratio of the unit load to the corresponding unit stretch is constant and the amount of unit stretch for any applied unit load can be calculated as follows:

$$E = \frac{S}{d} = \frac{\frac{P}{A}}{\frac{e}{L}} = \frac{PL}{eA} \qquad (3)$$

The term E, which, as expressed in the above formula, is the ratio of the unit load to the unit stretch, is known as "Young's modulus" or the "modulus of elasticity," and it has been experimentally determined to have an average value of 30,000,000 for all steels regardless of grade.

As the length of a member is increased when a load is applied, the transverse dimensions (diameter in the case of pipe) are correspondingly decreased in accordance with the same laws. However, the decrease in the transverse dimensions are not as great as the increase in the length, but the ratio between the two is constant. This relationship (transverse deformation/axial deformation) is known as "Poisson's ratio" and for steel has a value of 0.3.

In order to illustrate the above elastic laws, assume that in a string of pipe the top joint exactly 30 feet in original length having an original ID of 1.995 inches is subjected to a total applied load of 50,000 pounds. The cross sectional area of the pipe is determined from a table of the dimensions of the particular pipe to be 1.30 square inches. Applying formula (1) to obtain the unit load:

$$S = \frac{P}{A} \qquad (1)$$

$$= \frac{50{,}000}{1.30}$$

$$= 38{,}340 \text{ pounds per square inch.}$$

Then, using formula (3), the amount of stretch per foot in the joint of pipe is obtained.

$$E = \frac{S}{d}$$

$$30{,}000{,}000 = \frac{38{,}340}{d} \qquad (3)$$

$$d = 0.001278 \text{ foot per foot.}$$

The total increase in length of the 30-foot joint is then found by formula (2) to be

$$d = \frac{e}{L}$$

$$0.001278 = \frac{e}{30}$$

$$e = 0.03834 \text{ foot.}$$

Knowing that by Poisson's ratio the transverse dimensions have been decreased by 30 percent of the unit stretch in length, the new I.D. of the pipe under load is found to be

$$\text{I.D. (new)} = 1.995 - 1.995\ (0.3 \times 0.001278)$$
$$= 1.995 - 0.0008$$
$$= 1.9942 \text{ inches.}$$

When, however, the load is released the joint of pipe is restored to its original dimensions.

Deformation Point

As previously mentioned, the above laws apply only within the unit load range below the elastic limit, and when this value is exceeded, both the axial and transverse dimensions receive a permanent deformation. After the elastic limit is exceeded the member stretches at a much faster rate than previously until the "yield point" is reached at which point the steel continues to stretch without application of additional load. For lower carbon non-alloy steels these points are readily determined from what is known as a stress-strain curve (unit load plotted against unit stretch), but in the higher grade steels these points are hard to pick and the steel industry has arbitrarily defined the elastic limit as the unit load which, when removed, has caused a permanent unit stretch of 0.00003. The yield point has been likewise defined as the unit load required to produce a unit stretch (under load) of 0.005. The latter value also has been adopted by the API with reference to tubular goods. The increment of unit load between these two points is relatively small and the permanent deformation so slight as to be inconsequential. Therefore, for all practical purposes the yield point can be considered as the limiting factor in pulling on tubing and drill pipe, although the elastic laws cannot be applied above the elastic limit. Although the values for the elastic limit are never published for oil field tubular products, in instances where the application of these laws are pertinent, such as in calculating stretch in hanging casing or "slack-off" in setting packers, the factor of safety used in such circumstances should place the load on the pipe well within the elastic range and it becomes unnecessary to reckon with stresses between the elastic limit and the yield point.

Continued Stretching

After the unit load has passed the yield point the steel continues to deform both axially and laterally at successively varying rates several times more rapid than that below the elastic limit until the "ultimate strength" is reached, when the steel continues to stretch without the application of additional load until the member ruptures at a unit load somewhat less than that at the ultimate strength.

As stated, when the elastic limit is exceeded, the steel member becomes permanently deformed. The amount of permanent deformation depends on the extent to which the elastic limit was exceeded. When the steel has been so stressed and the load is removed and subsequently re-applied, the yield point will have been increased by the "cold working" above its original value, and the unit stretch above the yield point will have been likewise decreased. However, for values of the unit load immediately above that corresponding to the original elastic limit, the characteristics of the material are not ordinarily altered sufficiently to condemn its use for the original purpose, unless the amount of permanent deformation destroys its use-

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fulness. Thus, a variation in the length of pipe does not destroy its usefulness, but a decrease in the ID of tubing, for example, sufficient to prohibit the running of swabs, paraffin scrapers, etc., would make it unfit for further use. Therefore, pipe can be stretched to its yield point without endangering its usefulness, although in so doing it is given a slight permanent deformation.

Meaning of "Steel"

The term "steel" embraces a multitude of metals from the standpoint of application to the fabrication of products. Steel is a mixture of iron, carbon, and in some instances other alloys such as molybdenum, nickel, etc., in which the carbon content does not exceed 1.70 percent. For each different combination of these ingredients a material with different properties exists. However, the difference in the characteristics thus obtained is to a large extent one of degree. Up to the elastic limit all steels follow the same laws and the value of Young's modulus and Poisson's ratio is the same, but by varying the composition and method of manufacture of the steel the elastic limit can be raised from 25,000 pounds per square inch for low carbon steel to in excess of 200,000 pounds per square inch for some alloy steels. As the yield point is increased the ratio of the yield point to the ultimate strength approaches 1.0; e.g., this ratio for low carbon Bessemer steel with a yield point of 25,000 pounds per square inch is 0.60 while for silicomanganese steel with a yield point of 230,000 pounds per square inch it is 0.95. At the same time the ductility (the amount of total stretch in the steel just before rupture as expressed in percentage elongation) decreases. The elongation in a 2-inch specimen of the former steel is 40 percent and for the latter it is only 4 percent. All of which means that absolute rupture being so much closer to the yield point, the greater the yield point the higher the factor of safety that must be used to insure against exceeding the yield point of the steel.

The following are the minimum physical properties of the steel currently used in the manufacture of seamless API drill pipe and seamless and electric weld API tubing as taken from API Standard 5-A, Twelfth Edition:

	Drill Pipe			Tubing		
GRADE	C	D	E	H-40	J-55	N-80
Yield—1000 Lbs.	45	55	75	40	55	80
Ultimate—1000 Lbs.	75	95	100	60	75	100
Percentage Elongation	20	18	18	27	18	16

If a sufficient length of steel rod or pipe is suspended in mid-air, the steel will ultimately fail under the accumulation of its own weight; the failure, assuming that the strength of the steel is uniform throughout its length, will of course occur at the top of the section, where the load is greatest. The length of steel of a uniform cross-section that can be suspended before failure is entirely independent of the size of the bar and depends only on the strength or grade of the steel. The same length of hair-fine wire made from Grade E steel can be suspended as could a jointless length of 6⅝ Grade E drill pipe. (Note, however, that it will suspend only the same length and not of course the same amount of weight.) Therefore, knowing the unit weight of steel, which is the same for all grades, it is possible to arrive at a simple formula which can be used for rough calculations for the tensional strength of various grades of pipe in the absence of suitable tables. The weight of a cubic foot of steel is 490 pounds, consequently the weight of a section of steel 1 foot long with a cross-sectional area of 1 square inch is 3.4 pounds. The weight of a section of L feet long is 3.4 L, and, when this weight equals the yield strength of a particular grade of steel, the corresponding L is the approximate length or "setting depth" of all sizes of upset tubing and drill pipe of that grade which can be hung at the yield point in a well containing no fluid.

$$L_y = \frac{Sy}{3.4} \qquad (4)$$

L_y = setting depth of pipe in tension

Sy = yield strength of steel.

When the pipe is submerged in fluid the setting depth is increased (weight of the pipe decreased) by the buoyant effect of the fluid—the heavier the fluid the greater the setting depth.

Determining Strength

After Ly has been found, the actual strength of the pipe at the yield point can be determined by multiplying Ly by the weight per foot of the pipe. Assume that it is desired to calculate the approximate yield strength of 2⅞-inch 6.50-pound external upset end J-55 tubing. The setting depth is 55,000/3.4 = 16,180 feet, from which can be calculated the yield strength, which is 16,180 × 6.50 = 105,100 pounds.

A check of the setting depth of the above tubing in the API table shows it to be 15,330, which is only 95 percent of the calculated value. The reason for this discrepancy is that a string of tubing does not have a constant cross section throughout its length because the additional steel in the upset joints and couplings furnish a deviation. Therefore, although all sizes of upset pipe, both drill pipe and tubing, fashioned from the same grade of steel will have approximately the same setting depths, these setting depths will vary slightly with the ratio of the weight of the joints to the weight of the plain pipe for the various sizes of pipe.

Upset Pipe

It will be noted that all statements herein are made with reference to upset pipe and do not apply to non-upset pipe. The reason for this is that the strength of a non-upset joint is considerably less than that of the plain pipe between the joints, and the load which may be applied in tension must be predicated on the joint strength rather than the pipe strength. On the other hand the joints of upset pipe are at least as strong as the pipe itself and their strength can be disregarded in calculations concerning upset pipe. Non-upset pipe is rarely used in fishing jobs and therefore will not be further elaborated upon here.

Now that the behavior under stress of steel from which pipe has been fabricated has been discussed, the performance of a string of pipe under actual pulling conditions can be described. The maximum unit load exerted on any part of the string occurs in the topmost joint of the string and is equal to the net weight of the pipe plus the pull on the fish. At the bottom of the string the load carried by the pipe equals that exerted on the fish and the load on each joint up the hole increases by the net weight of the pipe hanging below it. Likewise, the stretch in each joint of pipe is a minimum at the bottom of the hole and increases going up the hole as the load increases to a maximum at the top. As the pull on the fish is increased the stretch in the pipe increases in proportion to the increase in load.

In view of the fact that the maximum load occurs at the top of the string, it can be expected that the pipe will fail first in the top joint if sufficient load is applied. Actually, however, due to a degree of variation in the strength of the steel, which can be controlled by the mills only to a certain extent, a variation in the wall thickness of the pipe, and the possibility of local crystallization of the

TABLE 1
Drill Pipe Data

O.D.	Weight, Per Foot	Wall Area Sq. In.	Stretch Feet per 1000' Per 1000 Lbs.	MINIMUM YIELD STRENGTH IN FEET OF PIPE AND THOUSANDS OF POUNDS									
				Grade C		Grade D		Blue Ribbon[1-2]		Grade E		Yoloy	
2⅜	6.65	1.843	.018086	12,470	83	15,240	101			20,780	138	22,170	147
2⅞	10.40	2.858	.011663	12,370	128	15,110	157	20,110	209	20,610	214	21,980	229
3½	13.30	3.621	.009206	12,250	163	14,970	199			20,420	271	21,780	290
1	13.40	3.621	.009206	.....	.....	.....	.....	19,780	265	.....	.....	.....	.....
	15.50	4.304	.007745	12,500	194	15,270	237	.....	.....	20,820	323	22,210	344
4	14.00	3.804	.008763	12,230	171	14,950	209	.....	.....	20,380	285	21,740	304
1	15.70	4.321	.007714	12,390	194	15,140	238	.....	.....	20,640	324	22,020	346
4½	16.60	4.408	.007562	11,950	198	14,600	242	.....	.....	19,910	330	21,240	353
1	17.20	4.408	.007562	.....	.....	.....	.....	18,760	322	.....	.....	.....	.....
	18.10	4.836	.006893	.....	.....	14,700	266	.....	.....	.....	.....	21,370	387
5⅛	22.20	5.762	.005785	11,680	259	14,280	317	.....	.....	19,470	432	20,770	461
1	24.00	6.112	.005454	.....	.....	.....	.....	18,640	447	.....	.....	.....	.....
	25.25	6.712	.004966	11,960	302	14,620	369	.....	.....	19,940	503	21,270	537
1	26.20	6.712	.004966	.....	.....	.....	.....	18,750	491	.....	.....	.....	.....
6⅝	25.20	6.527	.005107	11,650	294	14,240	359	.....	.....	19,420	489	20,720	522
1	29.20	7.363	.004527	.....	.....	.....	.....	18,450	539	.....	.....	.....	.....
1	32.50	8.405	.003966	.....	.....	.....	.....	18,930	615	.....	.....	.....	.....

[1] Non-API Sizes, Weights or Grades. [2] Manufacturer Quotes Average Values only; Minimum Values Herein Given are 80 percent of Quoted Average Values.

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pipe, it is quite possible the string will first fail in some joint other than the top, but probably close to the top.

Noting Stretch of Pipe

When the fish has been secured and before pulling is commenced, the position of the pipe opposite the rotary is marked so that the subsequent stretch in the pipe can be noted. A pull is then exerted on the pipe by the draw works and the amount of stretch ascertained. If the pipe is then slacked off it will return to its original position opposite the rotary, provided of course the fish has not moved and the elastic limit has not been exceeded. If twice the original pull is then exerted, the pipe will be stretched twice that caused by the original pull, but when slacked off the pipe will again return to the original position opposite the rotary. This action will continue until the elastic limit is exceeded, after which the pipe will no longer return to its original position. When the elastic limit of the first joint to fail is exceeded, the mill scale at the point of failure will begin to flake off, and the pipe will continue to stretch with the application of but little additional load until the overstressed joint picks up strength due to the cold-working of the metal. If the load is then removed a new position opposite the rotary is obtained to which the pipe will return after loading and slacking off until the elastic limit of another nearby joint is exceeded, after which the process is repeated. As the increasing application of load is thus continued, the ultimate strength of the joint whose elastic limit was first exceeded will be reached; the pipe will then begin to stretch rapidly, and, although the draw-works will continue to hoist the pipe, no additional pull will be recorded on the weight indicator. At this point the pipe will visibly neck down and will very shortly pull in two. The sudden releasing of the pipe will quite possibly severely kink the string below the break, particularly if the size of the hole or casing is large compared with the diameter of the pipe.

For high-grade steels the above action is somewhat modified by the absence of a clearly defined yield point. The load interval between exceeding the yield point and pulling the pipe apart is much smaller than for the lower grades, and the total stretch before pulling in two is considerably less. For these reasons it is much easier to determine what is occurring when using non-alloy pipe than when using Grade E drill pipe or N-80 tubing.

Reference has been made several times to the "net weight" of the pipe hanging in the well fluid. The net weight is the actual weight of the pipe less the buoyant effect of the fluid in which it is immersed. The weight reduction thus afforded by the fluid is equal to the weight of the fluid displaced by the pipe, the principle discovered by Archimedes 2000 years ago.

The percentage of the actual weight which constitutes the net weight ("buoyancy factor") can be obtained from available tables, or the net weight can be roughly calculated from the following simple formula:

$$\text{Net Weight} = \text{Actual Wt.}\ (1 - .015 \times M) \qquad (5)$$

M = weight of fluid in pounds per gallon.

The expression $(1 - .015\,M)$ is the so-called "buoyancy factor," which, for example, for 10 pounds per gallon mud is 0.85, or 85 percent. The net weight of the pipe should be used to calculate the accuracy of the weight indicator, after which, of course, all loads will be taken directly from the indicator readings.

In conjunction with fishing jobs, it is frequently desired to check the amount of stretch for various loads on the pipe. In this way it is possible to determine if the pipe is being stressed beyond the yield point. The stretch in pipe is equal to the total of the stretch placed in the pipe by the weight of the pipe itself plus the stretch pulled by the load applied by the draw works. Thus

$$e = e_L + e_D \qquad (6)$$

e_L = stretch due to weight of pipe

e_D = stretch due to applied load.

To determine e_L: with no applied load the load on the bottom foot of the string of pipe is zero, whereas on the top foot of the string the load is P_L, where P_L is the net weight of the entire string. Therefore, in view of the fact that the load-stretch relationship is a straight line function, the average load, which is $\frac{1}{2}$ P_L, can be used to determine the total stretch due to the weight of the pipe. From equation (3)

$$e_L = \frac{(\frac{1}{2}P_L) \times L}{EA} \qquad (7)$$

$$P_L = [(L \times .2833 \times A \times 12) \times f]$$

.2833 = weight of cubic inch of steel

f = buoyancy factor

$$e_L = \frac{\frac{1}{2}[(L \times .2833 \times A \times 12)\, f] \times L}{(30 \times 10^6)A}$$

$$= (.567 \times L^2 \times 10^{-7}) \times f$$

The stretch in the pipe due to the weight applied by the draw-works also can be calculated from equation (3) as follows, in which P_D is the pull applied on the fish by the draw-works:

$$e_D = \frac{P_D \times L}{EA} = \frac{P_D \times L}{(30 \times 10^6) \times A} = \frac{P_D \times L}{3A} \times 10^{-7} \qquad (8)$$

A is, of course, the area in square inches of the cross-section of the pipe. It should be noted that stretch is expressed in feet rather than inches throughout this article.

These formulas for stretch do not take into consideration the lateral reduction of the pipe according to Poisson's ratio, which introduces a slight error; however, they are considered sufficiently accurate for work of this nature and are much simpler than if the correction was made.

Stuck Pipe

In actual fishing operations e_L has already been placed in the pipe while going in the hole before the fishing ever begins, therefore, e_D will be the only variant throughout any one series of operations at any given depth. The important thing to remember is that, so long as the elastic limit has not been exceeded, for any given increase in the load applied by the draw-works there will be a proportionate increase in the stretch e_D; e.g., doubling the applied load doubles the stretch due to the applied load.

A problem which frequently occurs in conjunction with pulling on stuck pipe is determining the point at which the pipe is stuck. This is easily done by determining the amount of stretch placed in the pipe above the point at which it is stuck by any known draw-works pull. The first step is to pull on the pipe sufficiently to pick up all the weight of the pipe. After this is done the pipe is pulled an additional amount and the amount of additional stretch in the pipe as a result of this pull is measured. Then, knowing the amount of pull and the corresponding amount of stretch, the depth at which the pipe is stuck can be calculated from equation (8). For example, assume that a 9000-foot string of 4½-inch, 16.60, Grade E drill pipe is stuck at some unknown point in the hole. The total weight of the string in 10-pounds-per-gallon mud is 127,000 pounds, so if the pipe is pulled to 140,000 pounds, then without doubt the entire weight of the unstuck portion of the pipe is being supported by the elevators. If an additional 60,000-pound pull is exerted on the pipe and the additional measured stretch is 3.27 feet, then from equation (8) it can be ascertained that the free length of pipe above the point at which it is stuck is approximately 7200 feet.

If, in the above example, it is desired to back off the pipe just above where it is stuck, exactly the net weight of the pipe above the backing-off point should be picked up so there will be neither tension nor compression in the coupling to be unscrewed. In this instance the net weight of 7200 feet of 16.60 pipe in 10 pounds per gallon mud would be 101,600 pounds.

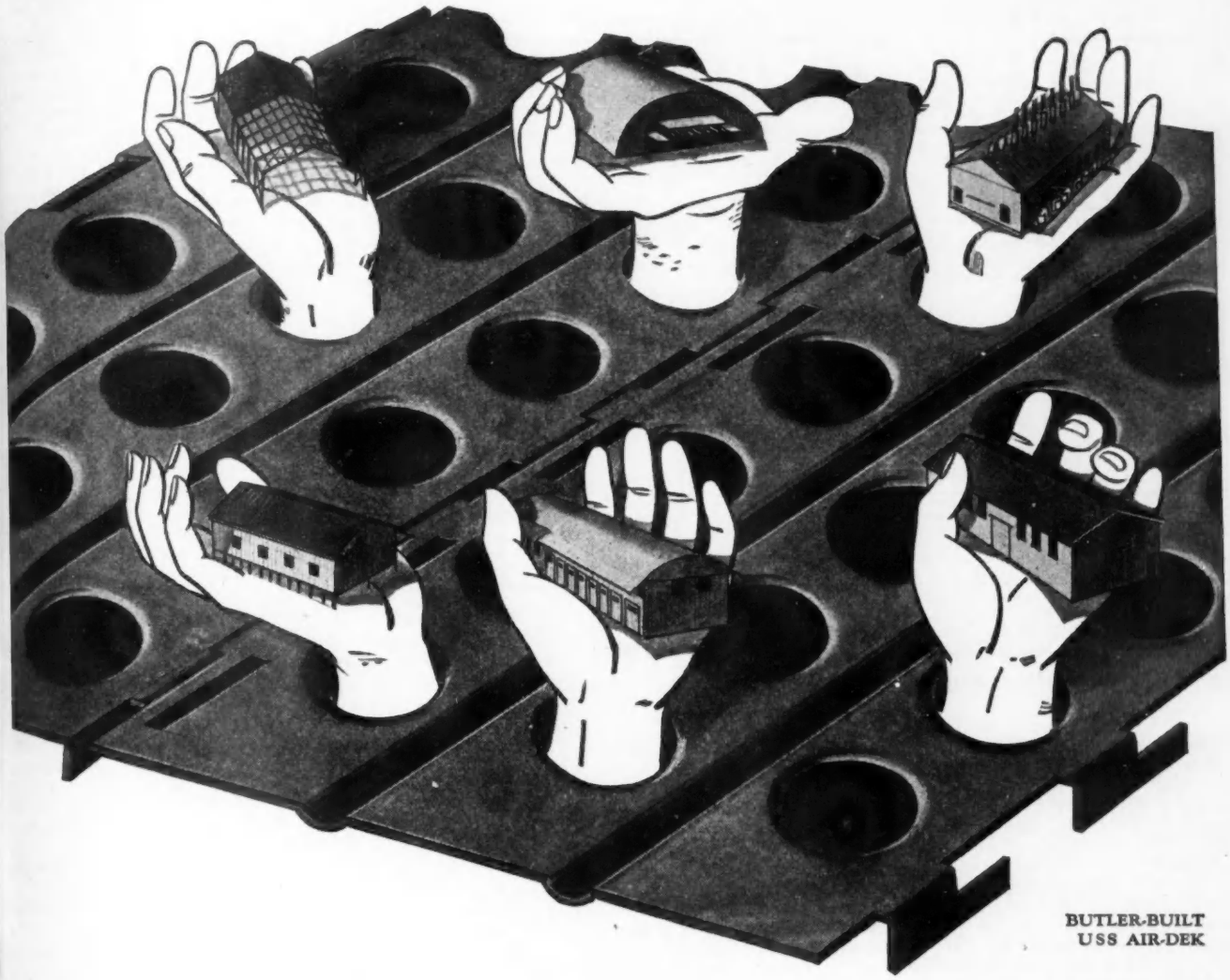
Jars are frequently used in fishing jobs to increase the force which may be ex-

TABLE 2

API EUE Tubing Data

Nominal Size	Weight, Per Foot	Wall Area Sq. In.	Stretch Feet per 1000′ Per 1000 Lbs.	MINIMUM YIELD STRENGTH IN FEET OF PIPE AND THOUSANDS OF POUNDS									
				Old Grade C[1]		Old Grade D[1]		H-40		J-55		N-80	
1¼	2.40	0.668	.49863	12,530	30	15,320	37	11,140	27	15,320	37	22,280	53
1½	2.90	0.799	.41693	12,410	36	15,170	44	11,030	32	15,160	44	22,060	64
2	4.70	1.304	.25562	12,490	59	15,260	72	11,100	52	15,260	72	22,200	104
2½	6.50	1.812	.18396	12,540	81	15,330	100	11,150	72	15,330	100	22,300	145
3	9.30	2.590	.12870	12,530	116	15,320	142	11,140	103	15,320	142	22,280	207
3½	11.00	3.077	.10833	12,590	138	15,390	169	11,190	123	15,380	169	22,380	246
4	12.75	3.600	.09259	12,710	162	15,540	198	11,300	144	15,530	198	22,590	288

[1] Non-API Sizes, Weights or Grades.



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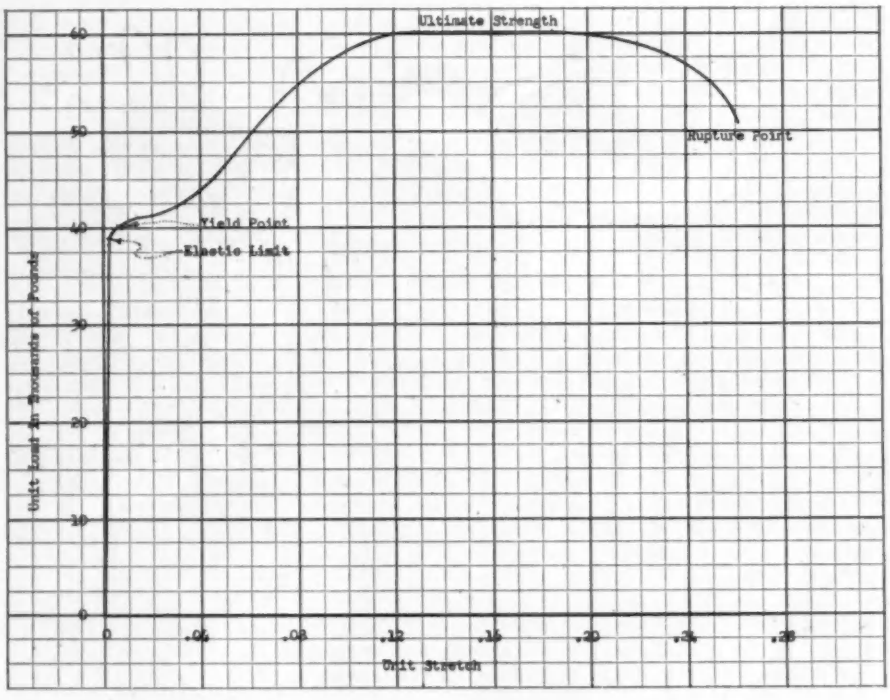

Unit load-unit stretch diagram for carbon steel similar to Grade H-40

erted on the fish. At first glance it might seem that by so increasing the load on the fish the unit load on the pipe would be proportionately increased, but such is not the case if the force is properly applied, due to the elasticity of the pipe. The previous discussion of application of loads on pipe by draw-works assumes the loads were applied slowly, in which case the force exerted on the fish was equal to the draw-works pull. If, however, the load is applied instantaneously, the actual instantaneous upward pull on the fish at the moment of application will approach twice the pull of the draw-works. If the load had traveled through a distance before it was applied, as is the case when jars are being used, then the instantaneous force applied at the moment of contact is further increased as a result of the velocity of travel. If, after the jars have been telescoped, the draw-works pull is maintained at the same amount as when the jars hit, then the maximum force thus exerted on the pipe, rather than being equal to the draw-works pull, is greatly in excess of it. If, however, the moment force is applied the draw-works pull is diminished by the driller such that the maximum stretch pulled in the pipe does not exceed that corresponding to the yield point, then the pipe will be stressed no more than if the static load corresponding to the yield point was applied slowly, as in straight pulling without the use of jars. Thus, the way to protect the pipe when using jars is first to pull slowly on the pipe without jarring until the maximum desired load is placed on the pipe, mark the position of the pipe opposite the rotary, and thereafter while jarring be sure that the pipe is not pulled beyond that point.

Safety Factor

Now occurs the question of what actually should be the limit on the unit load to be placed on pipe. Most operators appear to use the yield point itself as the limit, although there are some who apply a factor of safety, in which event it should be applied to the yield strength. If, in pulling a string of pipe to the calculated yield point, one or two joints are actually stressed beyond the yield point, then the cost of failure is nominal provided the failure is detected. If, on the other hand, following this procedure actually results in a rupture, then practically the entire string may be ruined and additional rig time incurred. Consequently, the ultimate strength, as well as the yield point, should be considered in arriving at a safety factor, and therefore, because of the fact that the ratio of the yield strength to the ultimate strength increases as the grade of the steel increases, the higher the grade of steel the greater the safety factor that should be used. In addition, the condition of the pipe and the service it has previously rendered will influence the safety factor.

When tubing has been stressed close to its yield point, it is extremely good practice to gauge the ID of the pipe before it is used for any purpose where it will be necessary to run close-fitting tools through it, such as a bottom-hole choke, pressure bomb, swab, etc. This can be done either while the tubing is suspended in the hole or after it has been laid down on a rack.

Summary

In summarizing the behavior of pipe in tension it is desirable to emphasize that within certain limits pipe is elastic. This means the induced stretch in the pipe is directly proportional to the load applied on the pipe, and when the load is removed the pipe returns to its original length. The ratio of the unit load to the unit stretch, which is known as the modulus of elasticity, has a value of 30,000,000. As the pipe is increased in length the diameter is decreased, the ratio of the unit axial deformation to the unit lateral deformation (Poisson's ratio) being 0.3.

When the unit load in the pipe exceeds the elastic limit the proportion between the unit load and the unit stretch ceases, and when the unit load exceeds the yield point the pipe is permanently deformed, both axially and laterally. Because of the fact that the elastic limit is difficult to determine, the yield point is used as the limiting factor for pipe and has been defined by the API as the unit load required to produce a unit stretch under load of 0.005. The increment of unit load between the elastic limit and the yield point and the amount of permanent stretch at the latter point are so small as to be inconsequential, and therefore the yield point will serve the desired purpose of establishing a limiting value beyond which pipe should not be stressed.

All grades of steel have the same values for the modulus of elasticity and Poisson's ratio, but the higher the grade the greater the yield point, the lower the total percentage elongation at rupture, and the greater the ratio of the yield point to the ultimate strength. The latter should be particularly borne in mind in the event pipe is pulled beyond its yield point.

When engaged in fishing jobs most operators appear prone to pull the pipe to the yield strength. However, to insure that it is not pulled beyond that point and particularly to insure against rupturing, it is considered good practice to apply to the yield strength a reasonable safety factor. The safety factor selected should, in addition to the condition of the pipe, depend on the grade of pipe. A higher safety factor should be used with the higher grades of steel because, as mentioned above, the higher the grade, the closer the yield strength approaches the ultimate strength.

The so-called setting depth of pipe in air is independent of its size and weight and is approximately equal to $\frac{Sy}{3.4}$. The slight amount of error involved is introduced by the extra weight of the couplings. The net weight of the pipe in fluid is less than the actual weight due to the buoyancy of the fluid. It can be calculated by multiplying the actual weight by the buoyancy factor for the fluid, which is equal to (1 — .015 M).

The amount of total stretch in pipe is equal to $e_L + e_D$, where

$$e_L = \left\{ (0.567 \times L^2 \times 10^{-7}) \times f \right\} \text{feet}$$

$$e_D = \left\{ \frac{P_D \times L}{3A} \times 10^{-7} \right\} \text{feet}$$

The depth at which pipe is stuck in the hole, if unknown, can be calculated from the latter equation.

The total pull on a fish can be greatly increased beyond the available static load which can be placed on the pipe by using jars, but in so doing the pipe must be protected by not exceeding the amount of stretch which would be placed in the pipe by the desired maximum static load.

Reference is made to Tables 1 and 2 pertaining to drill pipe and tubing respectively, in which is given the data necessary to apply the formulae given herein. Included in these tables is the stretch in 1000 feet of pipe per 1000 pounds of pull, and this value can readily be used to check the yield point and determine the depth at which a string of pipe is stuck.

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Why potential differences related to lithology exist in bore holes is not always well understood. The result of recent investigations, made with a view of explaining simply these potentials is outlined in this and a forthcoming article

PART 14

Electrical Potentials in Bore Holes

EARTH potentials were observed for the first time more than a hundred years ago by the Englishman, R. W. Fox, who made potential measurements in a mine shaft in Cornwall.[1, 2] However, it was not until the beginning of the twentieth century that this phenomenon was used extensively for exploration purposes. During the 15 years which followed World War I, the potential method of surface exploration was widely applied all over the world to many mining and even geological problems.[3] Notwithstanding this intensive work at the surface of the earth and in mine shafts, the possibility of finding electrical potentials in bore holes which were related to lithology seems to have been overlooked during the first years of electrical logging. Only after making a considerable number of resistance measurements in wells was it realized that significant potentials were spontaneously generated in the hole itself.[4] Many hypotheses were made to explain these potentials shortly after their discovery.[5, 6] Only in very recent years, however, have satisfactory theories been advanced which account for the results obtained.[7, 8]

Many Sources of Potential

According to present theories, matter is largely, if not entirely, electrical in nature. Since the earth's crust comprises a large amount of electrical conductors subjected to many external influences, it is not surprising that electrical phenomena should be observed almost everywhere in the ground.

The principal sources of electrical potential are:

1. Contact of dissimilar substances.
2. Electrochemical action.
3. Electromagnetic induction.
4. Miscellaneous (heat, pressure, etc.).

Although potentials resulting from all these causes can be observed in rocks or in sedimentary formations, some of them are of such small magnitude that they can be disregarded as far as conventional electrical logging is concerned. Other ones, although existing in the ground, cannot always be observed in bore holes. To aid in a better understanding of the subject, all these potentials will be described briefly. Special emphasis will be given later to those which seem to play an important part in well logging.

Contact Potentials. When dissimilar substances are brought in contact, a difference of potential can be observed between them. Sedimentary formations consist of rocks and fluids of various nature. It can therefore be expected that contact potentials should exist in the ground. This has been verified in holes which contained no fluid, in mine shafts, etc.

When different solid substances are rubbed against each other, they acquire electric charges. This frictional electricity can also be observed when a liquid moves against a solid, or flows through openings provided in a solid (streaming potential). It is probable that frictional electricity is a particular case of contact electricity where the charges are carried away.

Frictional electricity seems to play only a minor role in electrical logging.

Electrochemical Potential. Many chemical reactions will, under proper conditions, give rise to electrical phenomena. This property is taken advantage of in galvanic cells. Electromotive forces of this nature exist also in the ground. For instance, electrical potentials can be observed in the vicinity of certain ore deposits, pyrite in particular. These potentials are ascribed to the oxidation of the mineral, and they are used for the location of the deposits which produce them. A similar phenomenon occurs in the vicinity of bore holes, and it is more than likely responsible for most of the potential differences observed in wells filled with a conductive fluid.

Telluric Potentials. Variable magnetic fields induce electric currents in conductors. The earth being surrounded and permeated by a magnetic field whose intensity varies constantly, electromotive forces are induced in the ground. These are usually called "telluric potentials." The secular and diurnal variations of the earth's magnetism are very slow and the resulting potential gradient is entirely negligible. On the other hand, the usual irregular surges of magnetism induce continually appreciable voltages in the ground. The resulting horizontal gradient averages several millivolts per mile. The vertical component is much smaller, however, and it is usually not noticeable in bore holes unless special conditions exist (nearby igneous intrusions, very resistant formations of great thickness). Although they have been used for surface exploration, telluric currents do not seem to be of any value in electrical logging at present.

Miscellaneous Potentials. Certain minerals (tourmaline crystals), when heated, become charged with positive electricity at one end and negative at the other (pyroelectricity). If cooled, the polarity is reversed. Other minerals (quartz crystals) develop electric charges when subjected to pressure (piezoelectricity). These phenomena are definitely polarized. As random crystal orientation prevails usually in sedimentary formations, pyroelectricity and piezoelectricity, as described above, do not play any significant part in well logging.

Pressure and temperature modify the electromotive force of galvanic cells. It can therefore be expected that these two

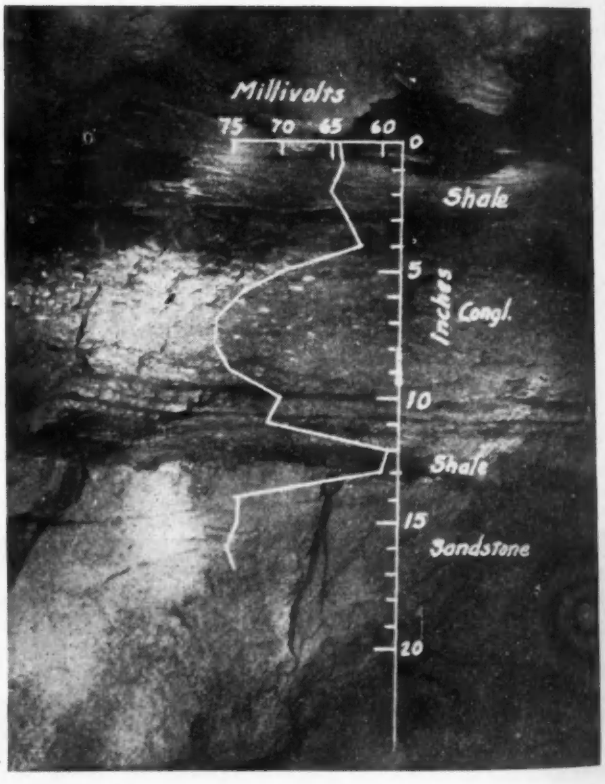

FIGURE 14-1
Shale, conglomerate and sandstone in soft, showing observed electrical potentials. (Courtesy of AIME.)

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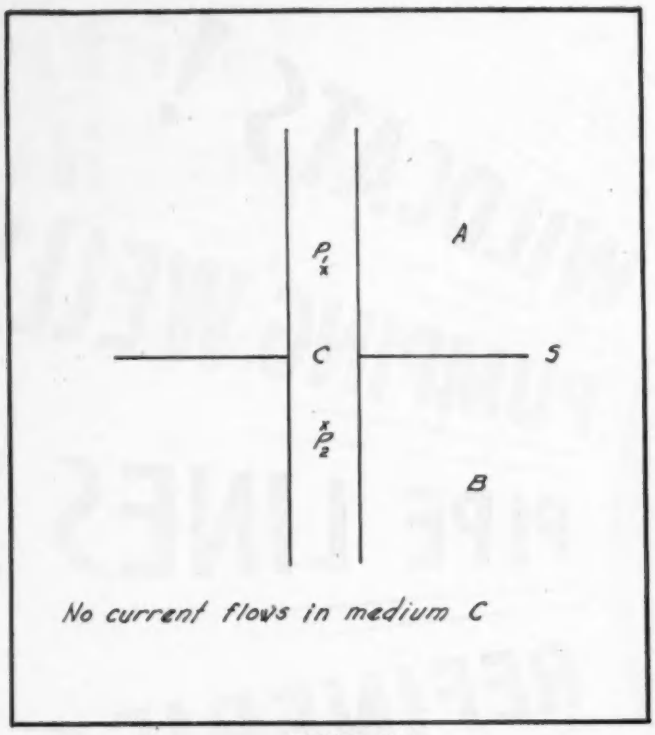


FIGURE 14-2
Illustration of contact potentials and of concentration potentials.

factors will modify to some extent the potentials of chemical origin found in bore holes.

Potentials different from those described above are produced by purely mechanical forces, pressure in particular. As large pressures exist in bore holes and in sedimentary formations, there is a possibility that they generate electric potentials. As yet this point has not been clarified because of the difficulty of investigating each cause of potential individually.

Potentials in Bore Holes

The potentials observed in bore holes can be classified in the two following groups:

1. The potentials which are found in the ground, even when no bore hole exists, They can be observed in mines, shafts, and holes which contain no drilling fluid. They are called "natural potentials."

2. The potentials which are found in bore holes containing drilling mud. They will be termed here "secondary potentials."

Secondary potentials seem to be produced by one main cause: electrochemical reactions. They are modified, however, by a large number of factors, among which the more important are:

a. The environment and distribution of the substances involved in the reactions.

b. External influences, such as temperature and pressure.

Natural potentials are difficult to measure accurately in bore holes, because of the problem of securing good electrical contacts which do not introduce spurious electromotive forces. For this reason, little is known about this phenomenon, and, it will be discussed only briefly. On the other hand, secondary potentials are easy to measure because the drilling mud insures a good contact with the measuring electrode without introducing spurious voltages, when proper precautions are taken. This permits a more satisfactory investigation of the phenomena involved, and a more complete description of these potentials can be given.

Natural Potential

The occurrence of natural potentials in bore holes has been adequately described only quite recently by Dickey.[1] Basically, they can be considered as being contact potentials occurring between the different beds of sedimentary formations.

Any dissimilarity existing between two substances which are in contact with each other results in a potential difference between them. The dissimilarity can be in the nature of the substances or, in the case of liquids, it can be in the nature of the salts dissolved, or even in the concentration of the same salt. The sedimentary formations found in petroleum areas consist largely of shales and sands or sandstones. The chemical composition of the solid particles constituting these beds is different. The nature and the concentration of the fluids which they contain varies from bed to bed. It is clear, then, that when a shale and a sand are in contact, a potential difference will usually exist between them.

Natural potentials (up to 100 millivolts) have been observed for many years in West Texas in fields where the bore holes contained no fluid. Recently, they have been efficiently investigated by Dickey who made a large number of potential measurements in wells and in a mine shaft in the state of Pennsylvania. Figure 14-1 is a photograph of a section of the shaft in which some of the measurements were carried out. One of the potential graphs obtained is plotted on the picture in order to show the exact correspondence between the result obtained and the lithology. The conglomerate and the sandstone of the section were found to be negative with respect to the shale beds, and the maximum potential difference observed were of about

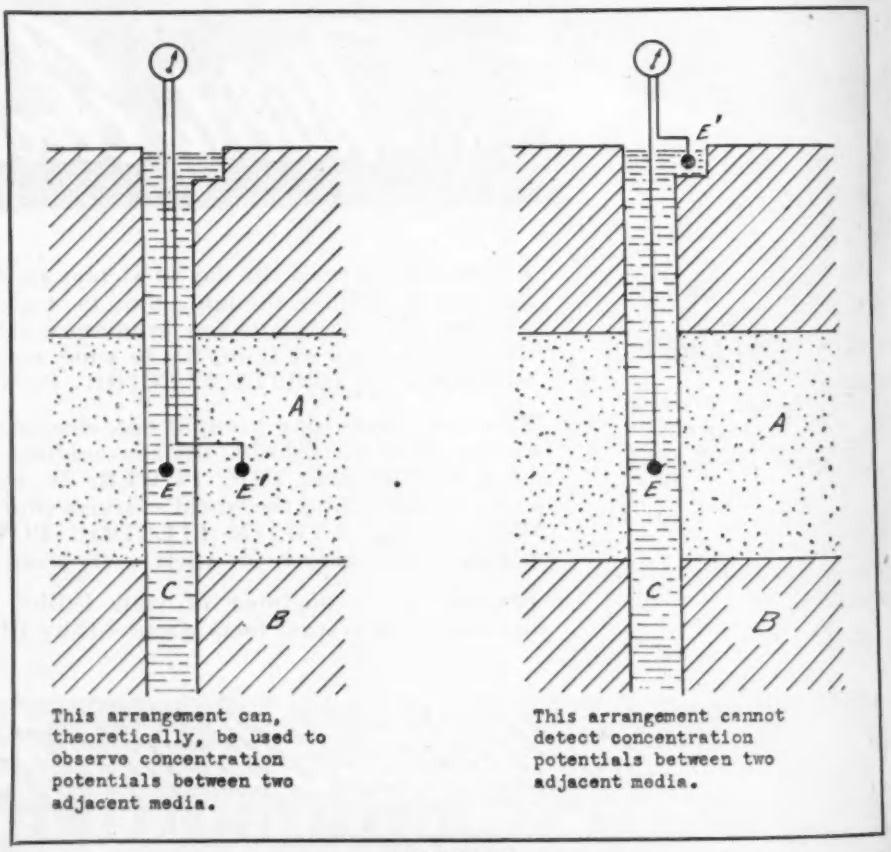
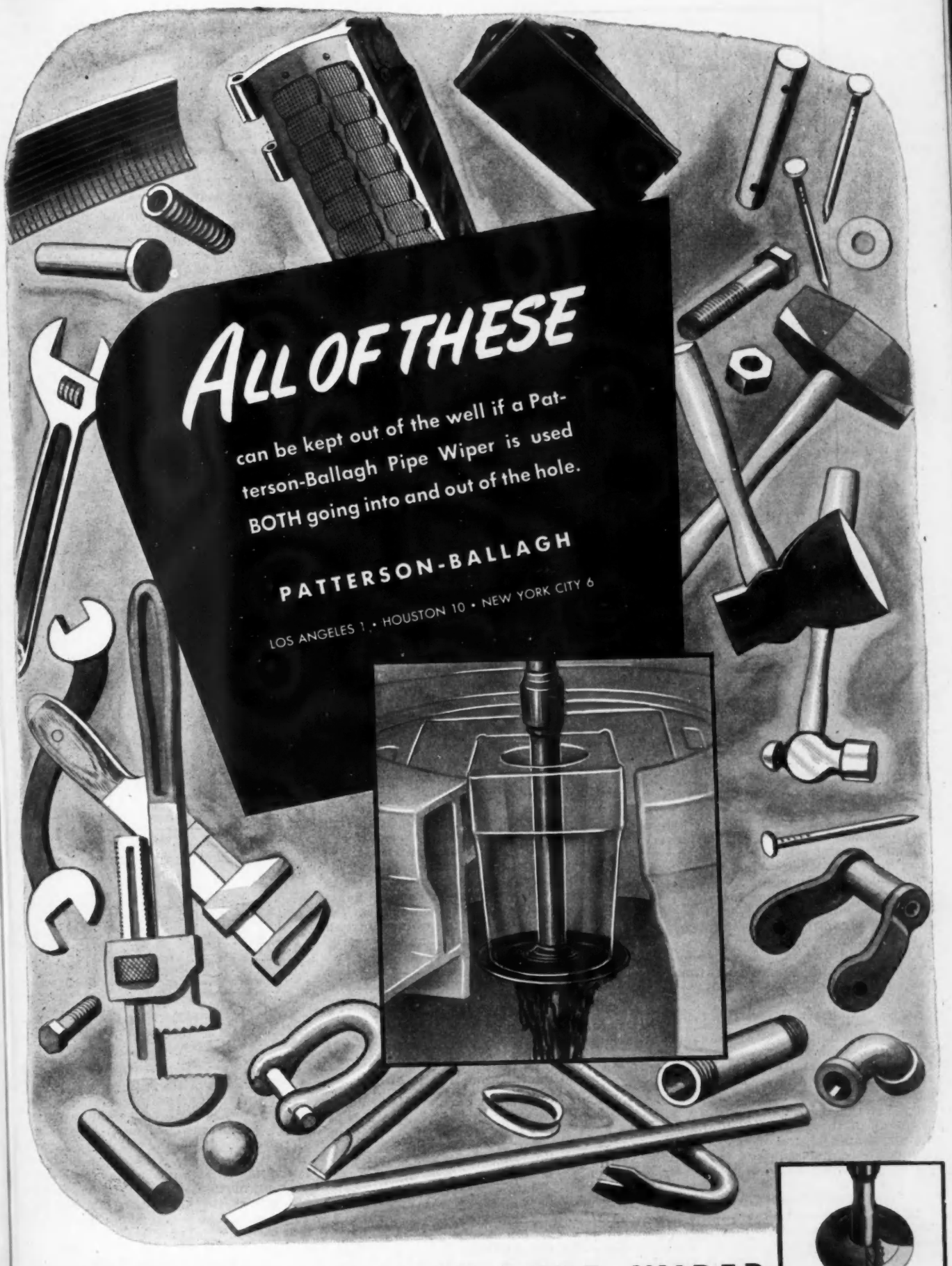


FIGURE 14-3
Observation of concentration potential.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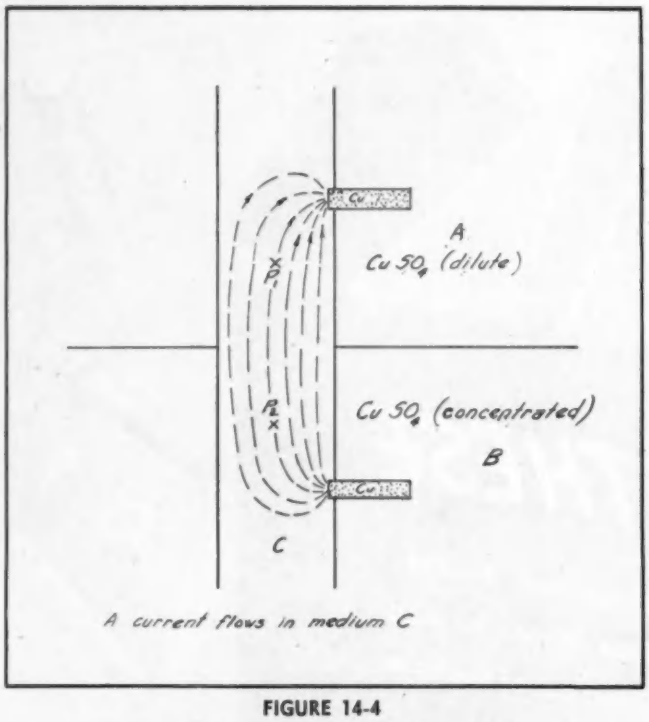

FIGURE 14-4
Concentration cell in operation (theoretical)

20 mv (millivolts). On the other hand, at other places of the shaft, no appreciable potential differences were found between a shale and a sand.

It is not impossible that the potentials actually observed under these conditions are partly due to the measuring electrodes themselves. More research will have to be done before natural potentials are fully understood. Readers interested in this topic may refer to the literature.

Secondary Potentials

The introduction of drilling mud or water in a bore hole creates a condition which is responsible for the relatively large potentials observed in rotary wells. For an efficient use of the potential graph of an electric log, it is necessary, not only to understand the influence of each pertinent factor, but also to be aware of the phenomena which do not play any part in the production of the bore hole potentials. This will prevent involving them unduly in the interpretation of the log.

For a good understanding of the subject, it is helpful to consider first the mechanism of contact potentials.

Contact Potential

The simplest instance of contact potential is found when two metals are brought in contact. In the case of zinc and copper, it is observed that zinc is charged positively, and copper negatively. The idea might occur to take advantage of this potential difference to obtain a simple source of electricity, for instance, by connecting the two metals by a wire in which a motor or an electric bulb has been inserted. If this were done, it would be found that absolutely no current flows in the motor or in the bulb. The same negative result is also obtained with the arrangement shown on Figure 14-2. In this figure, A and B are two different metals having a horizontal surface S in common. They are traversed by a vertical hole filled with a third metal C. This arrangement is similar to sedimentary formations cut by a bore hole filled with mud, except that the conductors used are of a different nature. Let V_A and V_B be the potential of A and B, respectively. The foregoing discussion has shown that the difference $V_A—V_B$ is not zero and it will be assumed that it equals one volt. It might be thought that, with certain metals at least, at a point such as P_1 in metal C the potential would be about the same as the potential V_A in metal A, whereas at a point such as P_2 in metal C the potential would be approximately equal to V_B, the potential of metal B. It might be further assumed that as $V_A—V_B$ equals one volt, a potential difference would then exist between P_1 and P_2, and that this difference could be observed by taking potential measurements inside of metal C. This, however, is not true, the potential in metal C is uniform. This has been actually verified by experiments and explained by electronic theories.[9] The same result is always obtained when different metals are in contact, regardless of the metals used. More generally, if any number of metals are arranged in series in order to constitute a chain, there will be no electric current at any point of the chain, regardless of the nature of the metals and of their arrangement.

Concentration Potential

A similar situation exists if electrolytic solutions are used instead of metals. It is known that when two aqueous solutions of a given salt are placed in contact, a potential difference can be observed between them when the concentration of the two solutions are different, and when proper measuring equipment is used. This is called "concentration potential," or "liquid junction potential." Basically, the condition is similar to that of two metals in contact. When three solutions are considered, an arrangement identical to that of Figure 14-2 can be set up for the investigation of potentials. Referring to this figure, A, B and C are assumed now to be hypothetical solutions of sodium chloride of different concentration. C is a solution of small concentration which represents the drilling mud contained in a bore hole. The concentration of B is large (to duplicate a salt water sand), and that of A is extremely small (to duplicate a fresh water sand). It will be assumed that there is no diffusion between solutions A and C or between Solutions B and C. Experimental as well as theoretical data show that no potential difference exists in solution C (nor in solutions A or B), notwithstanding the difference in potential occurring between A and C, B and C, A and B. In other words, the potential at point P_1 equals the potential at point P_2, and no current flows within one of the liquids or in the chain. If it is desired to ascertain whether or not a potential difference exists between C and A, or between C and B, it is necessary to place one potential measuring electrode E in medium C, and another potential measuring electrode E′ in medium A, or in medium B, respectively, as shown on the left side of Figure 14-3. If the second electrode E′ is also placed in solution C, whether close to A, or close to B, or anywhere else, no potential difference will be observed regardless of the position of electrodes E and E′, as long as they remain in medium C (see arrangement to the right of Figure 14-3).

Potentials observed in bore holes are frequently thought to be caused, at least partly, by concentration potentials, one of the electrolytic solutions being the mud and the other being, for instance, the water contained in sands. The foregoing discussion shows that this is not possible. The confusion arises probably because two adjacent solutions of different concentration are wrongly assumed to constitute a concentration cell, whereas they could constitute only one of the elements of a complete concentration cell.

If, instead of sodium chloride, different salts are used as solutions for the arrangement of Figure 14-2, the same result obtains regardless of the nature and concentration of the salts considered.

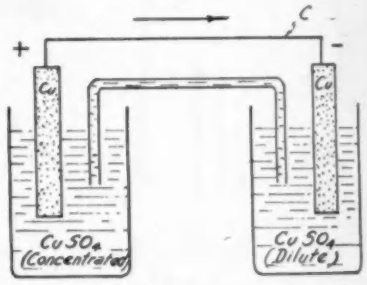

FIGURE 14-5
Actual concentration cell.

The preceding result is explained simply by the law of conservation of energy; no current can be established in a circuit unless a source of energy is available. In order to utilize concentration potentials to provide a constant electric current, means must be provided to supply energy to the system continuously. This energy is not available in the system shown on Figure 14-2.

Concentration Cells

A very convenient method for supplying energy to the system like that illustrated on Figure 14-2 is by chemical re-

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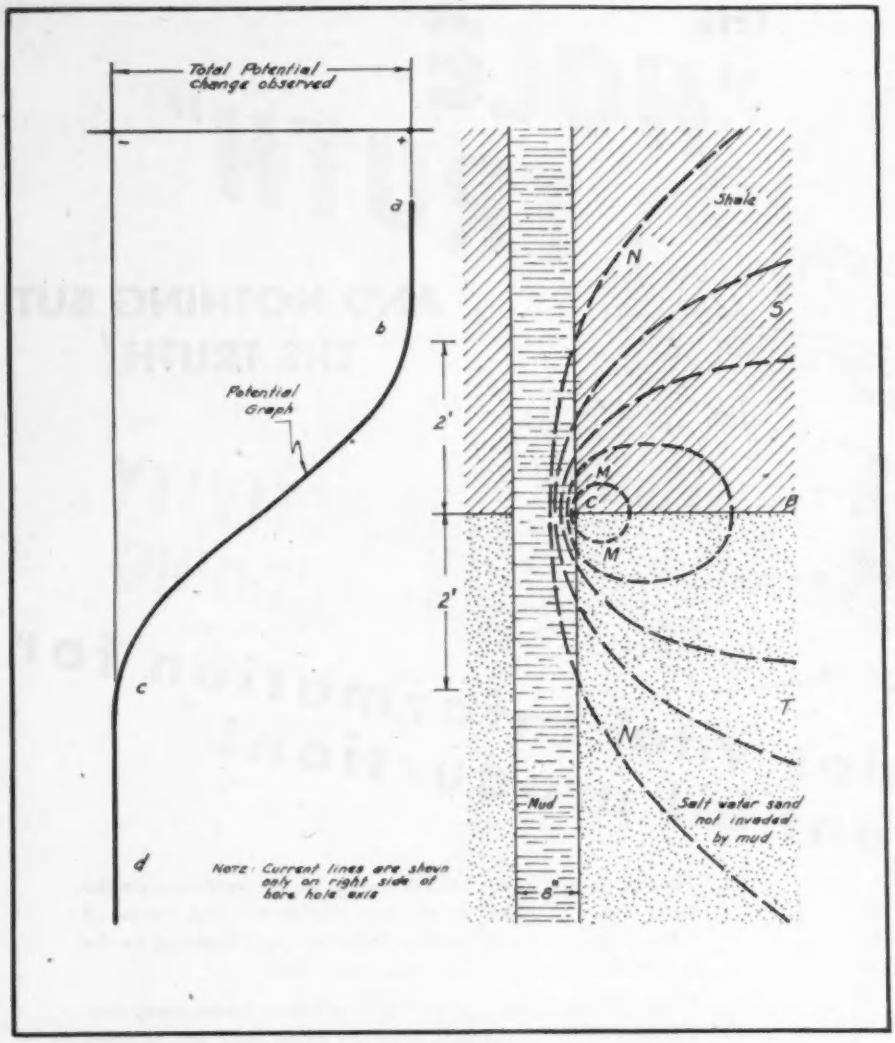


FIGURE 14-6
Current line pattern and potential graph in the vicinity of shale-sand bore-hold boundaries. (Sand not invaded by mud.)

action. The resulting arrangement is called a concentration cell. Consider, for instance, two solutions of copper sulphate A and B of different concentration placed in contact. No energy can be obtained from this combination alone. If the solutions are arranged with another electrolytic solution C, as shown on Figure 14-2, no potential difference will be observed between points P_1 and P_2. If it is desired to use the solutions A and B to make a concentration cell, it is necessary to add more elements, for instance, to place a bar of copper in each solution. The resulting arrangement gives the following chain:

$$Cu \mid CuSO_4 \text{ (concentrated)} \mid CuSO_4 \text{ (dilute)} \mid Cu$$

which forms a complete concentration cell, the copper bars of which are the terminals. This cell can be used as a source of current, i.e., it can be made to generate potential differences in an external circuit. For instance, if the cell terminals are connected to a solution C as shown by Figure 14-4, a current will flow inside of C and there will be a potential difference between any two points P_1 and P_2 of this solution.

Actually, an arrangement as shown by Figure 14-4 would be extremely difficult to obtain, and in practice concentration cells are made up differently. Figure 14-5 shows an actual concentration cell supplying current to a conductor C. The terminals are usually called the poles of the cell. The energy available in this cell comes from electrochemical reactions taking place between poles and solutions.

The foregoing discussion has shown the important fact that when potential differences exist between two different substances, an electric current does not necessarily flow from one to the other. On the other hand, it can be shown that when potential differences are observed in a homogeneous substance, there must be a current flowing somewhere through that substance. This is a very important point which will give an insight into the nature of the bore hole potential phenomena.

Shale-Sand Potential

Consider a shale bed S and a salt water sand T having a common horizontal boundary B. These two formations are shown in vertical cross section on Figure 14-6. Let us assume that they are traversed by a bore hole filled with mud M, and that the hole diameter is uniform and equal to 8 inches. A careful inspection of a large number of electric logs shows that the potential graph obtained near a contact shale—salt water sand is essentially as shown on the left side of the figure. (For the sake of clarity, the scale of the log has been compressed horizontally). If the formations and the mud are assumed to be homogeneous, the potential graph consists of a substantially straight part ab opposite the shale, and another straight part cd opposite the sand, cd usually being negative with respect to ab. These two sections are connected by the reverse curve bc. The difference in depth between points b and c is of the order of four feet.

As the potential is constant above b and below c, no current is flowing in the bore hole at ab nor at cd. On the other hand, there is a rather large potential gradient between b and c, the largest value corresponding to the steepest part of the potential curve, namely, to the level of boundary B, approximately. The existence of this gradient necessarily means that there is an appreciable flow of current in the bore hole at the level of B. The decrease in gradient above and below this point means that the current flow decreases steadily above and below boundary B. From the foregoing description, it is obvious that the pattern of the paths of this current must be substantially as shown by the curves to the right of the figure, the arrows indicating the direction of current flow. These current lines have been drawn with the assumption that the formations and the mud have essentially the same resistivity. If this were not the case, the current line pattern would be different, as will be shown later.

To avoid complicating the figure, current lines have been drawn only on the right side of the bore axis, although a symmetrical pattern also exists on the left side. The same pattern would be obtained in every vertical plane passing through the bore hole, and therefore, it should be visualized in three dimensions.

A few current lines, such as MM, close their path near the bore hole, whereas other ones, such as NN, close their path very far from it. The spread in the shale and in the sand is due to the fact that the current seeks the path of least resistance, namely, a path having an extremely large cross section whenever this is possible.

Cause of Shale-Sand Potential

A current can be maintained in a circuit only if there is some source of energy to sustain it. In the concentration cell of Figure 14-5, the energy came from the reactions occurring between poles and electrolytes, namely, from chemical sources. In the ground, the only energy

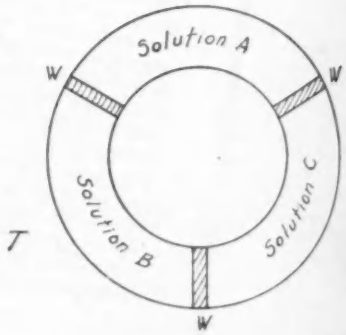
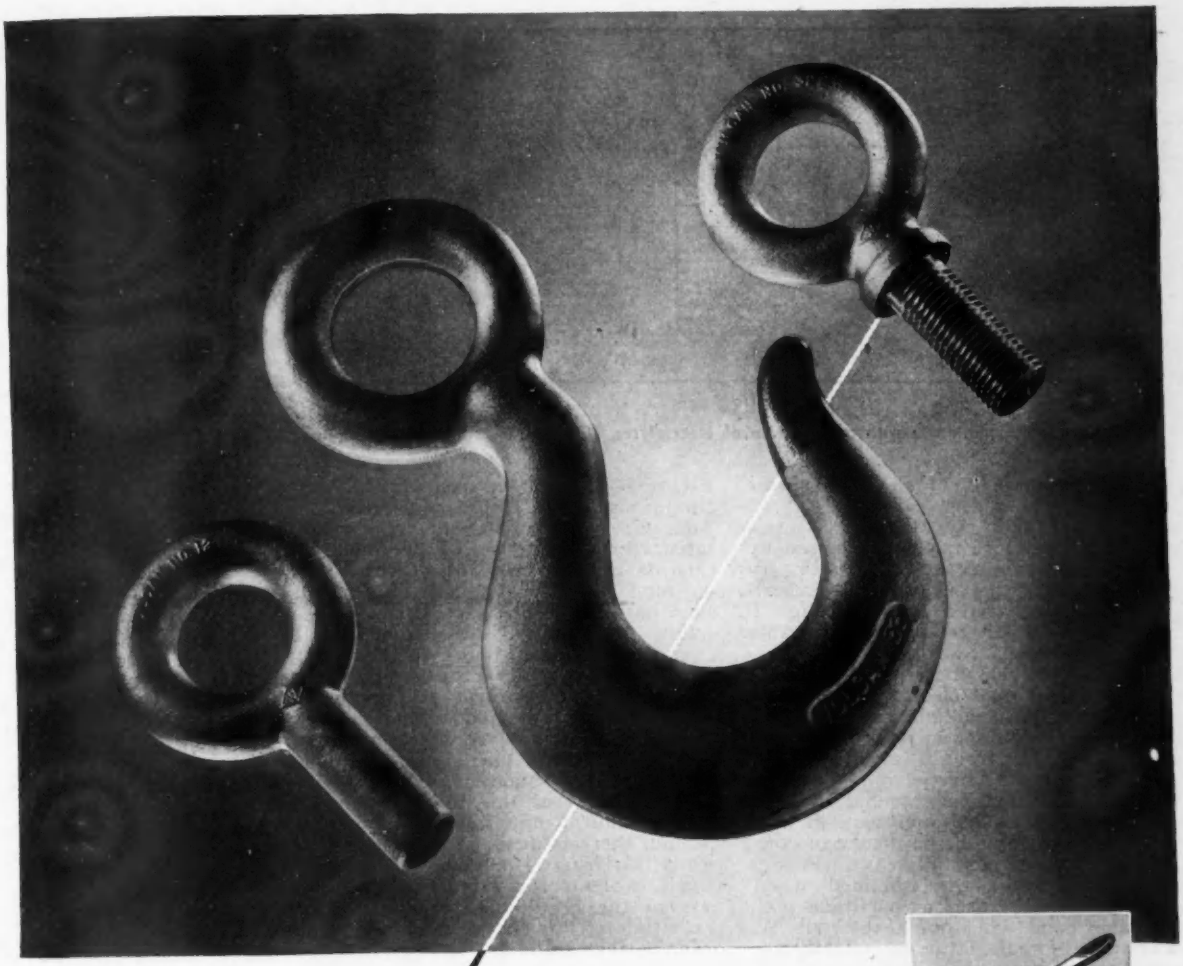


FIGURE 14-7
Investigation of potentials with combination of electrolytes.



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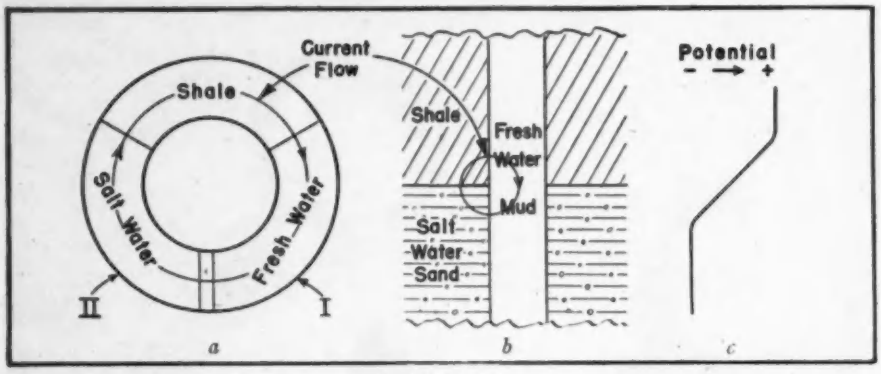


FIGURE 14-8
Experiments with combination of electrolytes. (Courtesy AIME.)

readily available is of chemical nature also.

That bore hole potentials are electrochemical in nature has been proved by experiments reported recently by Mounce and Rust.[1] For these experiments Mounce used a circular trough T divided into three sections by permeable walls W of unglazed porcelain (see Figure 14-7). When these sections were filled with different electrolytes, or with solutions of the same electrolyte of different concentration, no current was observed in the trough, and potential differences were detected only between different sections. No potential changes were observed in any given section. This is in accordance with the theory of concentration potentials outlined previously. The same result was obtained when clean sands were used as partitions. On the other hand, when one of the walls W was made of shale, large potential differences were observed in either one of the sections, thus indicating that current was flowing in the trough. In order to investigate more fully this particular condition, Mounce filled one entire section with shale (see Figure 14-8) another with fresh water, and the third one with an aqueous solution of sodium chloride. The two latter sections were separated by a permeable membrane in order to prevent diffusion. It was then observed that a current was flowing from the shale to the fresh water, then to the salt water and back to the shale, as shown by the arrow. On the other hand, when the two liquids were identical in nature and concentration, however large or small this concentration, there was no current.

To obtain quantitative data, a slightly different experimental setup was built. The results showed that when shale was one of the elements of the electrolytic chain, the potential difference in the fresh water section was from 100 to 150 millivolts, indicating that the electromotive force of the chain was of the order of 200 milivolts.

It is evident that the energy necessary for the generation of these currents is of neither mechanical nor thermal origin. It must be of chemical origin.

As pointed out by the authors, a similar chain exists in bore holes containing drilling mud, as shown on the right side of Figure 14-8. The salt water of the trough is duplicated by a salt water sand, whereas, the fresh water is duplicated by the mud. According to the result of the laboratory experiments described, a current must circulate from the shale to the mud, then to the sand and back to the shale, as shown by the arrow. Comparing this path to that of Figure 14-6, it can be seen that the two conditions are basically identical.

Mounce's theory seems to explain satisfactorily the source of the potentials existing in bore holes filled with drilling mud not only qualitatively but also quantitatively. The exact chemical reaction giving rise to the current is still unknown however, but this is not of great importance as far as the following discussion is concerned. It is evident that an essential element of the electrochemical chain involved in the process is the shale bed, or more exactly certain substance or substances present in the shale. In view of the huge volume of electrochemical material existing in the ground, there is available there a practically unlimited amount of energy, which explains the remarkable steadiness of the bore hole potentials. The magnitude of this energy is of the same order as that made available by certain ores, which have been known to generate steady currents for a considerable number of years without any decrease in magnitude.

It is obvious, from Mounce's experiments, that if the shale bed of Figure 14-6 were replaced by a sand, the potential would disappear, whether this sand carries fresh water or salt water.

The foregoing discussion shows that the potential curve should be interpreted basically as follows: as long as the graph remains close to the highest negative potentials observed, the corresponding formation does not usually contain any appreciable amount of shale. The larger the departure of the graph from these potentials, the greater the amount of shale. When a certain critical amount of shale is reached in a bed, the graph records the maximum positive potential which it is possible to have under normal conditions.

This interpretation applies fully only when the assumptions made previously are fulfilled: namely,

1. The formations consist of shales and sands.

2. They are homogeneous, and their resistivity is of the same order of magnitude as that of the mud. This implies implicitly that the sands are not invaded by the mud.

When the foregoing conditions are not fulfilled, the potential distribution in the ground is modified, which might alter considerably the potential graph, as will be shown later.

Small Energy Evolved

The intensity of the current flowing in the bore hole shown on Figure 14-6 can be easily calculated. It can be seen that at the level of the boundary B, all the current of the electrochemical chain flows in the hole. At this point, the potential gradient is maximum.

Electric logs show that the steepest gradients observed are of approximately 100 millivolts per foot. To calculate the corresponding current intensity I, Ohm's law will be applied to a hypothetical cylindrical conductor in which a uniform current is flowing at such a rate that the same potential gradient, namely 100 millivolts per foot, exists. This conductor will be one foot long (L=0.3 meters), eight inches in diameter (bore hole diameter D = 0.2 meters), its resistivity will be $\rho = 1$ ohm-m (mud resistivity), and at its ends there will be a potential difference V of 100 millivolts. The resulting current is:

$$I = \frac{V}{R} = \frac{\pi D^2 V}{4\rho L} = 10.5 \text{ ma.}$$

The numerical values used in this

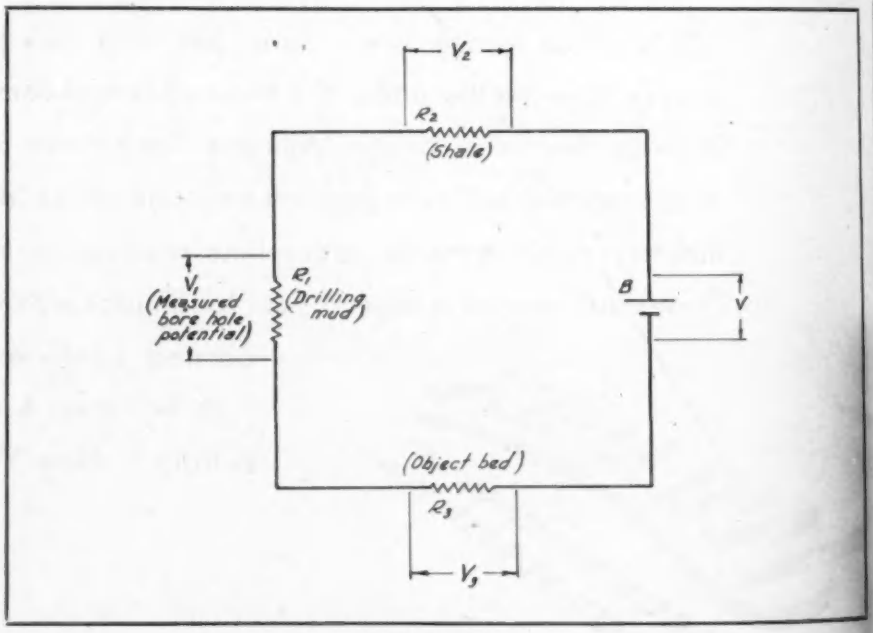
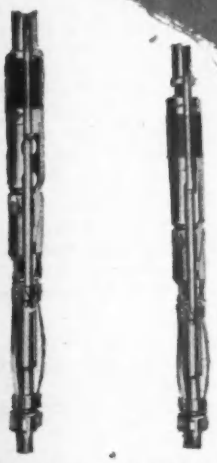


FIGURE 14-9
The equivalent circuit of the conducting system: shale-sand bore hole.

AN Extra Hand ON THE TOUGH JOBS



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CONTROL HEAD PACKER TYPE C-1
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One third of an average well cost is crew time—that's why the use of correctly engineered, precision built Guiberson tools that save time put the equivalent of an extra hand on the job for you. And when it comes to the *tough* job there is a Guiberson tool built especially to get it done in the easiest, quickest way. The Type KV-30 Guiberson packer, especially designed for the most severe well testing and production conditions, is a proud member of the Guiberson "unseen crew." Easy to set, easy to pull, the KV-30 is designed for loads up to 20,00 feet of 2½" upset tubing and pressures up to 10,000 lbs. Gives positive recovery by sleeve between gudgeon coupling and head. Eliminates conventional recovery ring welded to mandrel. Double sealing with special neoprene sleeve and conventional ground seat. 30" opening eliminates nozzling effect at valve.

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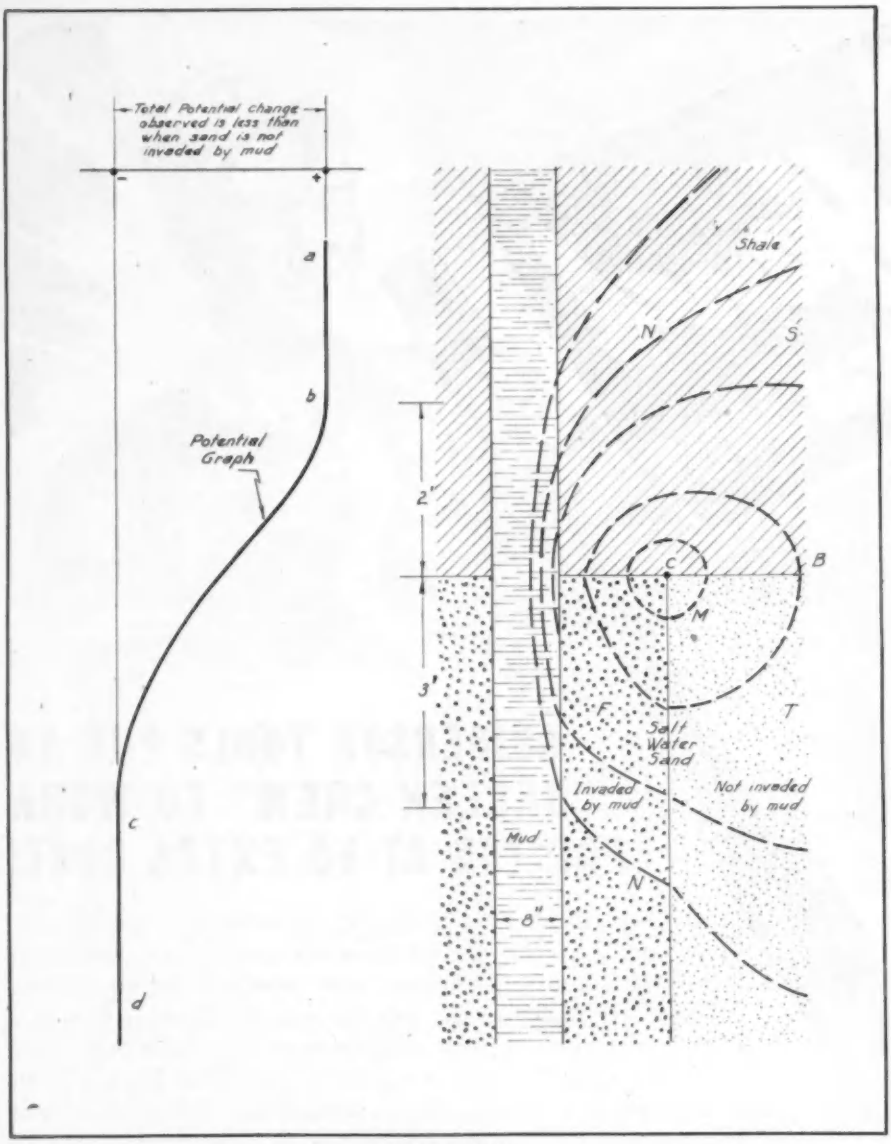

FIGURE 14-10
Current line pattern and potential graph in the vicinity of shale-sand bore-hole boundaries. (Sand invaded by mud.)

calculation have been selected from actual potential graphs in such a manner as to give for I the maximum value which can be expected in bore holes under most conditions. Therefore, any shale-water sand boundary will usually give rise to a current which will not be greater than 10 milliamperes. The corresponding energy is supplied by several thousand cubic yards of formations. It is evident that it would take several years to exhaust at this rate the energy contained in such a huge volume of active substance.

Equivalent Circuit

In order to get a better insight into the mechanism of the bore hole potentials, it is helpful to draw the equivalent circuit of the conducting system involved. This circuit is shown on Figure 14-9, where B is a battery duplicating the electromotive force setup in the electrochemical chain. R_1, R_2, and R_3 are the resistances which the electric current has to overcome in the mud column, in the shale, and in the bed under investigation, respectively. The battery B has been arbitrarily assumed to be between the shale section and the sand section of the circuit. Whether this is correct is immaterial for the following discussion.

It is known that in a circuit similar to that of Figure 14-9, the potential difference between the extremities of each leg is proportional to the corresponding resistance. If V_1, V_2, and V_3 designate the potential drops in the bore hole, in the shale, and in the object bed, respectively, then

$$\frac{V_1}{R_1}=\frac{V_2}{R_2}=\frac{V_3}{R_3}=\frac{V}{R_1+R_2+R_3}$$

where V is the electromotive force of the battery B.

To avoid confusion, the potential V generated in the ground will be termed "electromotive force" (e.m.f.), whereas the potentials observed in the mud column will be called "bore hole potentials," or "potentials." "Sand potential" will designate the potential of the mud column near the middle part of the sand. "Shale potential" will refer to the potential of the mud in the shale far from the boundary B.

It is obvious from the preceding discussions that bore hole potentials are caused by electromotive forces, which must be greater than the potentials observed.

The potential drop V_1 in the bore hole, namely the maximum deflection between shale and sand observed on the potential graph can be expressed

$$V_1=\frac{R_1}{R_1+R_2+R_3}\times V \qquad (14\text{-}1)$$

If the section being logged consists of shales and salt water sands, the resistivity of the three conductors, namely, mud, shale, sand, is of the same order of magnitude. Figure 14-6 shows that the current lines in the mud column are extremely crowded, whereas they are considerably spread in the other two media. The application of equation (2-3) established previously (see Part 2, The Oil Weekly, August 14, 1944) to these three legs of the circuit would show that

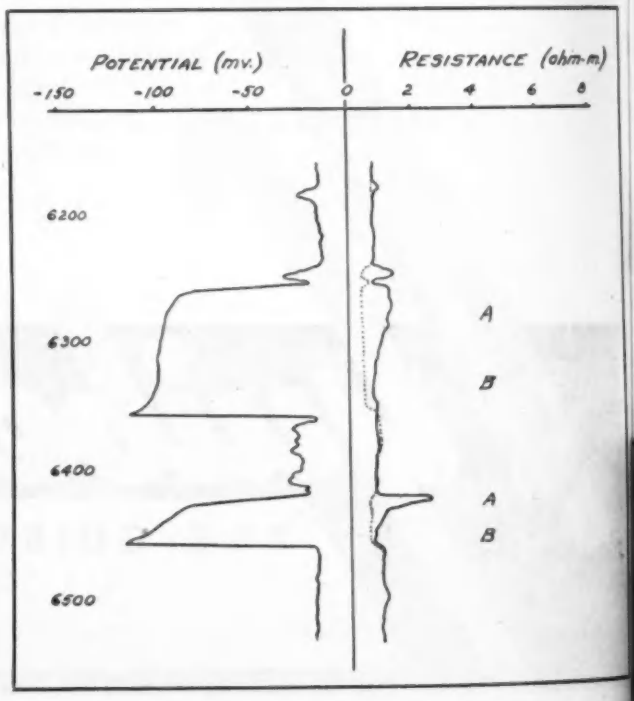

FIGURE 14-11
Changes in potential due to variable degree of mud invasion. (Lafitte Field, Louisiana.)

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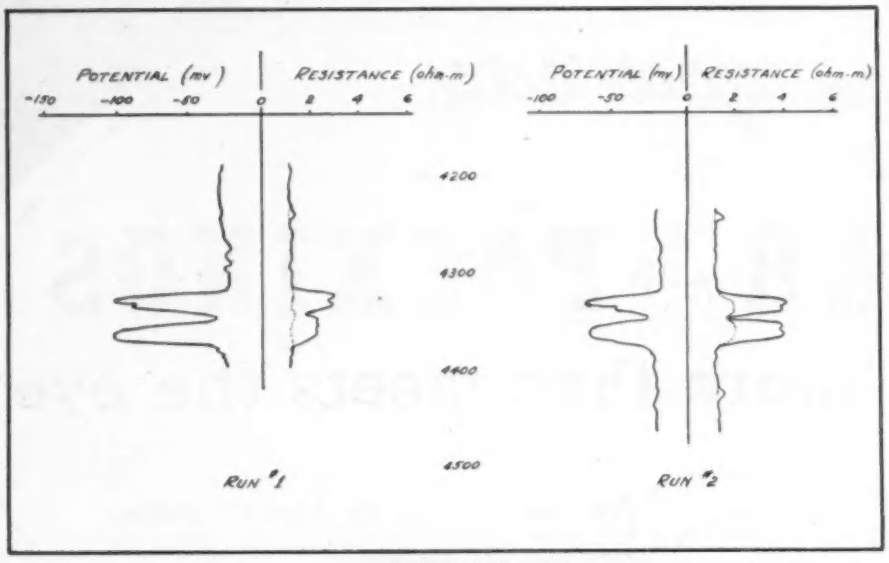

FIGURE 14-12

Decrease in potential due to increase in mud invasion in a South Texas well.

the numerical value of R_1 is considerably greater than that of R_2 and of R_3. The value of the fraction $\frac{R_1}{R_1 + R_2 + R_3}$ is very close to unity. Therefore, V_1, the potential difference observed between sand and shale, is approximately equal to V, the electromotive force of the chain. It has been seen that V is of the order of 200 mv. The potential V_1 observed between shales and clean salt water sands will therefore be of the order of 200 mv. also. This is in accordance with the experimental values obtained on this type of sand.

The preceding discussion applies only to the condition illustrated on Figure 14-6, namely, to a clean salt water sand which is not appreciably invaded by the drilling fluid.

Mud Invaded Sands

When a sand is appreciably invaded by the mud, the conducting system considered before is slightly altered. This new condition is illustrated on Figure 14-10 where F represents the invaded section. It will be assumed that the water of this section is identical to the mud filtrate, although this is not entirely correct. The resulting error will not invalidate the following qualitative discussion. The resistivity of section F is therefore several times greater than that of M (see Figure 7-5, Part 7, THE OIL WEEKLY, September 18, 1944), and the current lines will be more spread in medium F than in the mud, as shown by Figure 14-10. On this figure the point C, common to the three materials and around which the current lines revolve, is no longer in the bore hole, as it was on Figure 14-6, but it is situated at a certain distance from it. The current lines, which were considerably crowded in the bore hole when there was no invasion (Figure 14-6), have now been spread (Figure 14-10), which causes a lowering of the resistance R_1. This, in turn, results in a lowering in the observed potential V_1.

This can be verified on many electric logs. Figure 14-11, for instance, represents a section of an electric log obtained in the Lafitte field (Louisiana Gulf Coast). The solid curve to the right is a single point resistance, whereas, the dotted curve is a multiple-electrode log obtained with a five foot spacing. The sand sections A, which are appreciably invaded by the mud can be easily distinguished from those, B, that are not, by comparing the two resistance graphs. It can be seen that sections A exhibit lower potentials than sections B.

The same phenomenon explains why potential curves obtained in sands on subsequent runs differ usually in the section where the hole was bottomed during the first run. In this section, the mud invasion was negligible during the first measurement, but larger during the next one, which results in a decrease in potential between runs. This is illustrated on Figure 14-12, where curves 1 and 2 represent the potential graphs respectively obtained during runs 1 and 2 in a Texas Gulf Coast well. The hole size and the mud resistivity were the same for the two runs. The only change in the physical condition of the hole is the different amounts of invasion revealed by the resistance curves. The electrode arrangements used for the resistance measurements of Figure 14-12 are the same as those used for Figure 14-11.

Thin Beds

The current pattern near the bottom boundary of a sand is the same as that found near the top contact, except that the direction of current flow is reversed. If the bed is thick, the two patterns do not overlap each other, and the sand is denoted on the log by a flat section situated on each side of a steep potential gradient (curve to the left of Figure 14-12).

If the bed is thin, the two current patterns interfere with each other, which results in a crowding of the current lines in the sand (sketch to the right of Figure 14-13). This crowding is associated with a large value of the factor R_3 of equation (14-1) which, evidently, decreases the value of V_1, the observed potential. As a consequence, the recorded potential is less than that obtained on thick beds, all other factors remaining the same.

ACKNOWLEDGEMENT

The writer is indebted to the American Institute of Mining and Metallurgy Engineers which gave permission to reproduce in this article several figures from two of their Technical Publications.

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Editor's Note—This same subject will be considered in Part 15, to appear in an early issue.

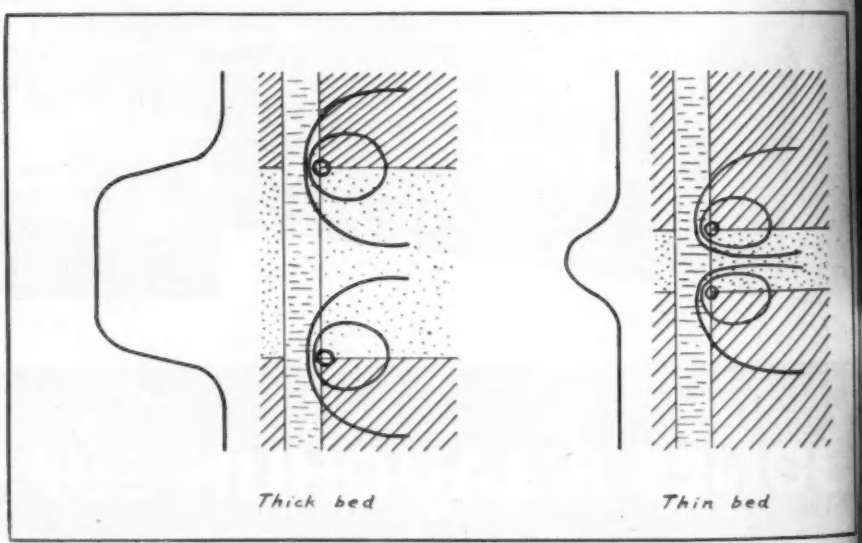

FIGURE 14-13

Influence of bed thickness on potential graph.

LOW WORTH RECORDING"

Said LA GLORIA SUPERINTENDENT R. D. MORGAN

"Maintenance on those eleven compressors is so low," said Mr. Morgan, "that it wouldn't pay us to keep it separate from the maintenance cost of the entire plant.

"The amount involved would be less than the bookkeeper's time to keep it separate."

This statement seemed incredible, until we examined the plant records and saw a whole year pass by without as much as one ring being changed in a single engine or compressor cylinder.

These eleven CLARK "Angle" Compressors, in the La Gloria Corporation's recycling plant at Falfurrias, Texas, have operated for three years, at discharge pressures of from 2,700 to 3,100 lbs., yet with only about 1/10 of 1% shut-down time due to engine fault or repairs.

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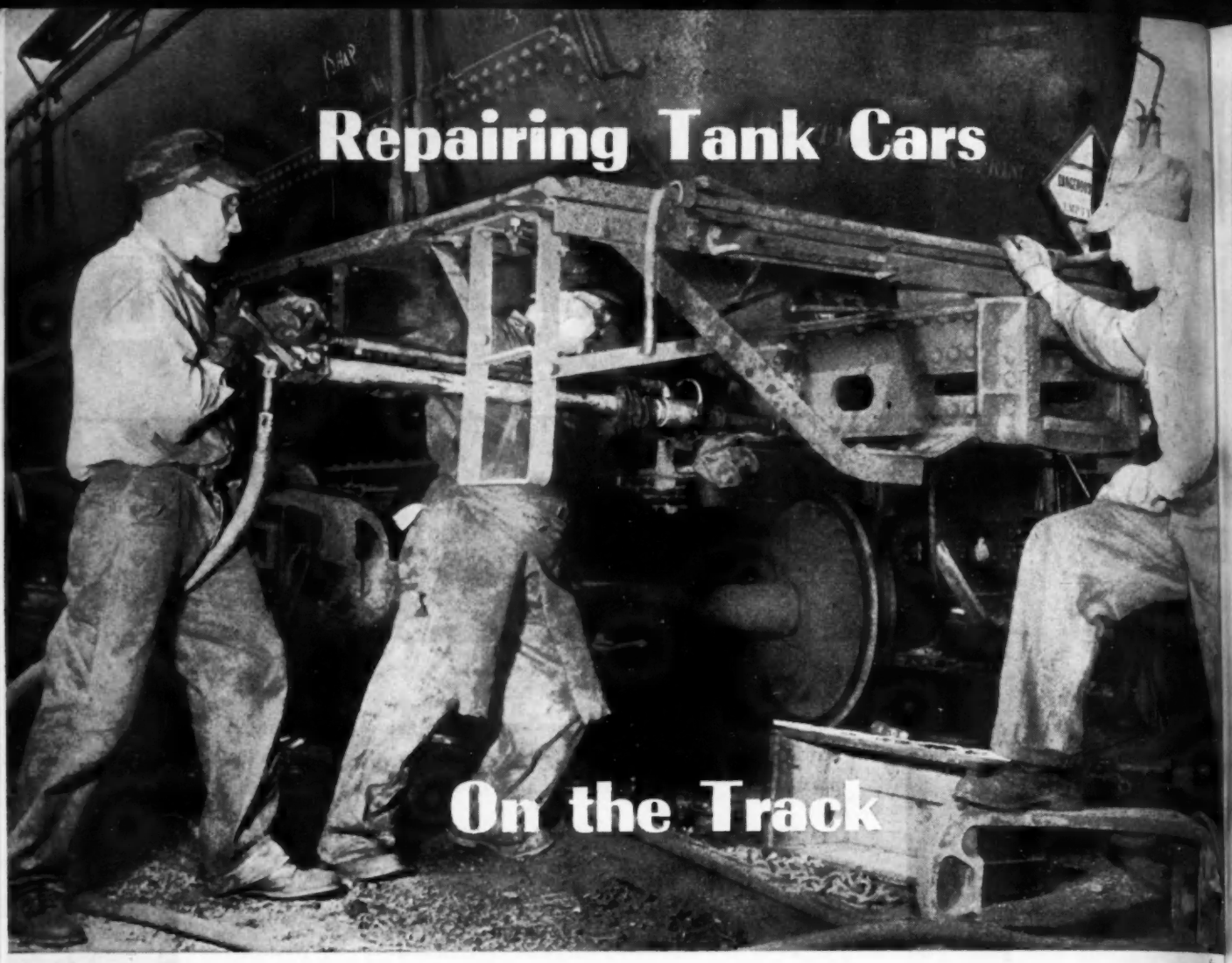
SETS THE PACE IN COMPRESSOR PROGRESS

Repairing Tank Cars On the Track



ONE of the most serious problems facing the Petroleum Administration for War during the early days of the war was the transportation of petroleum and its products from the oil fields and refineries of the Southwest to the Eastern seaboard which, until the war, had depended upon ocean-going tankers for 98.5 percent of its supply. In converting to overland transportation it became essential to move tremendous quantities of petroleum and refined products in railroad tank cars. Between 1941 and 1943 railroad transportation of petroleum to the East Coast was revolutionized so that by June of the latter year more than 80,000 of the nation's 107,000 tank cars in petroleum service throughout the United States were in this service.

Innumerable problems resulted from the evolution. PAW urged the oil industry to exercise all of the ingenuity at its disposal to keep the cars rolling. The accompanying article describes how one company, disregarding the additional costs involved, has met this challenge by developing a program of tank car repairs that eliminates the delay of sending equipment to repair shops, thus greatly reducing turnaround time and increasing deliveries.

The accompanying article was prepared and issued by the Petroleum Administration for War.

Photo above shows bent centersill of a car repaired with a pneumatic hammer at Sun Oil Company repair yards at Marcus Hook, Pennsylvania.

WITH railroad tank cars doing seven times their peacetime work, Sun Oil Company of Philadelphia has adopted vigorous methods of handling the breakdowns resulting from this excessive use.

At two principal terminals the company has installed faciliites to do speedy repair work right on the tracks, instead of sending the cars to railroad shops. Exclusive of investment, this work is costing Sun Oil Company $300,000 a year more than the allowable cost set by the Association of American Railroads.

The results, according to traffic executives in charge of such repairs, is an efficiency in tank car handling at least 50 percent greater than the average. The turnaround time between company terminals at Twin Oaks, Pennsylvania, and Meraux, Louisiana—a round trip of nearly 3000 miles—has been cut to less than 12 days. Sun's average delivery of crude oil per tank car per day on this run is 19 barrels, as compared with 12 barrels for the same distance for the industry as a whole.

The importance of this margin to the wartime oil supply is emphasized by the volume of the company's tank car traffic, which in 1943 amounted to 350,000,000 miles.

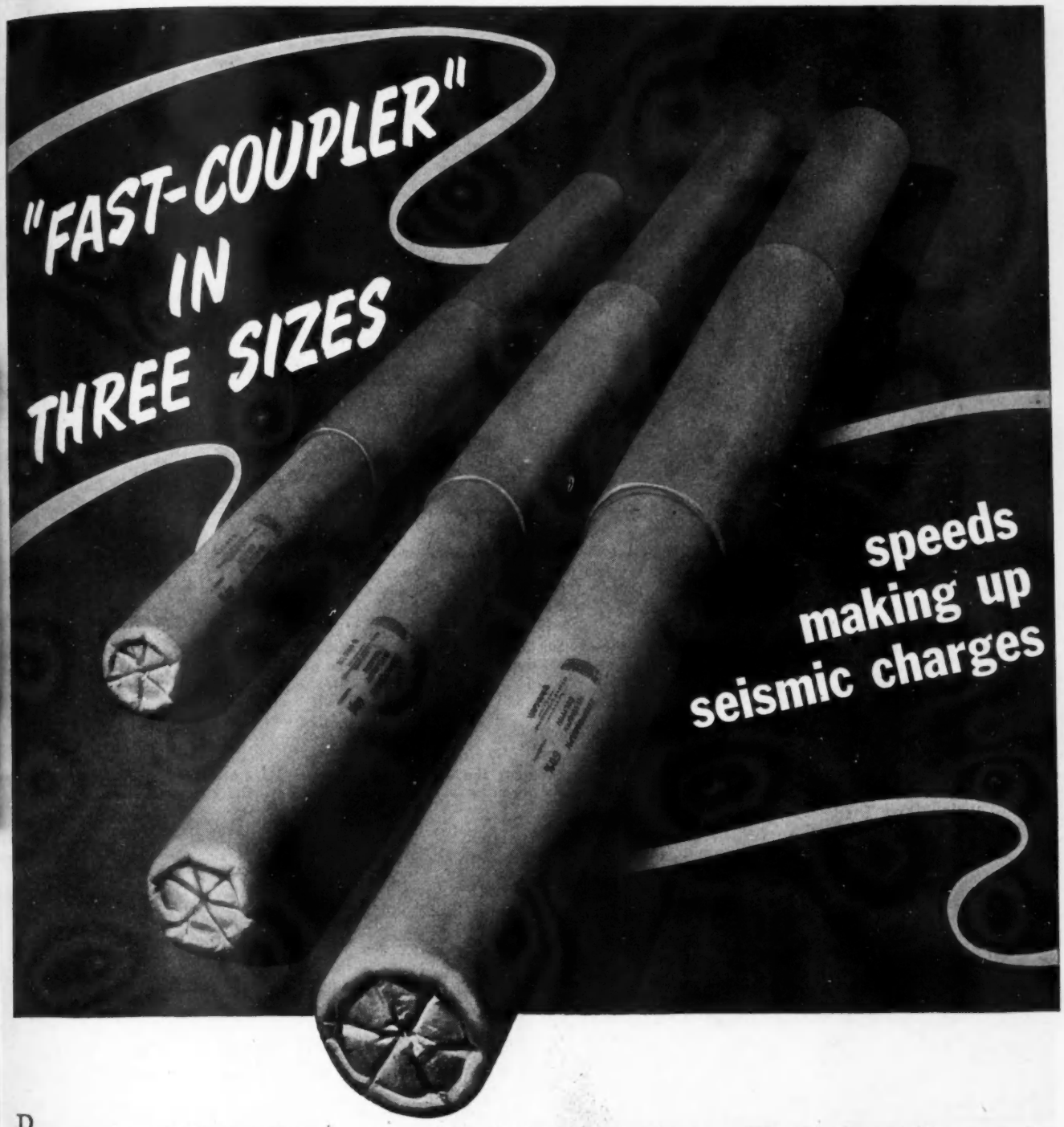
This vital, behind-the-scenes repair program has been of special importance to the eastern states, which, before the war, were dependent on ocean-going tankers for 95 percent of their incoming petroleum.

Through construction of the Big-Inch and Little Big-Inch pipe lines under direction of the Petroleum Administration for War has greatly eased the situation on the Atlantic seaboard, substantial railroad tank car shipments still are necessary. Rail movement of oil products is expected to take on added importance as increased quantities have to be delivered at Pacific Coast ports for enlarged operations against Japan.

Benjamin P. Atkinson, Jr., is general foreman of both the on-the-track repair yard at Twin Oaks and of Sun's heavy repair shops at the Marcus Hook, Pennsylvania, refinery. He had this to say:

"We work night and day, seven days a week. These cars are taking an awful pounding, but we have to make permanent repairs and get them rolling again, and that applies to a good many cars that would simply be scrapped in time of peace.

"The most common damage is a cracked or bent centersill, which can be



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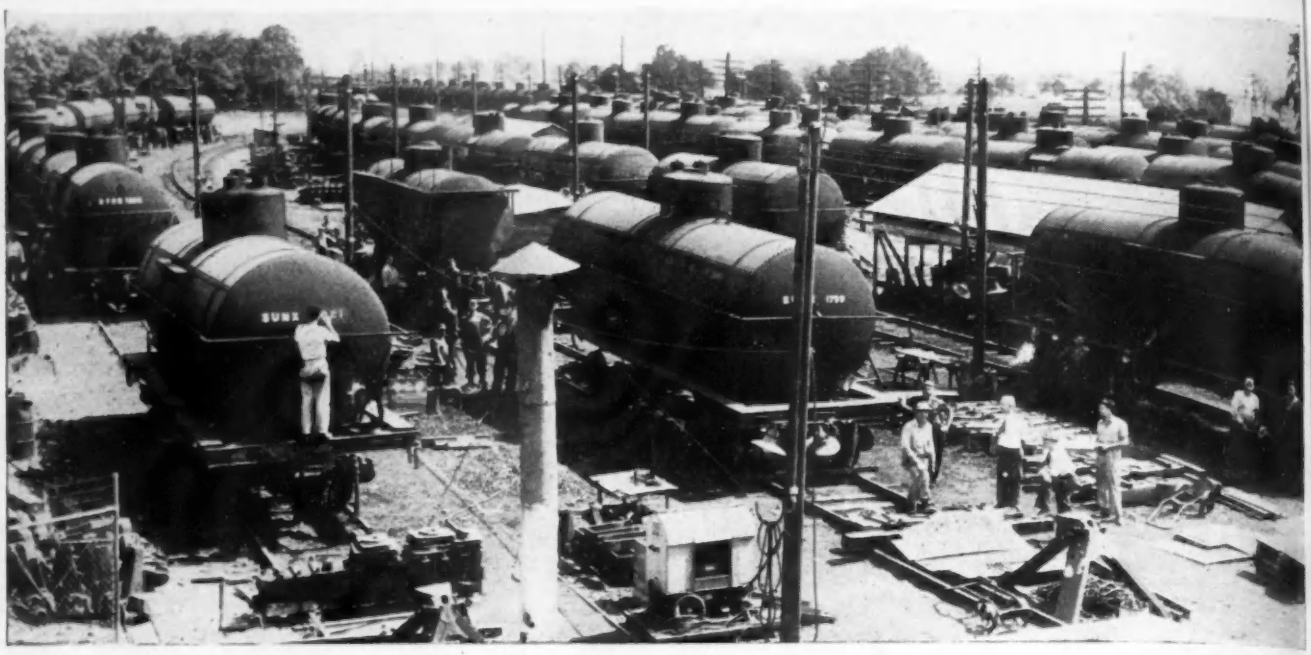

caused by suddenly braking a train, by pushing a heavy string of cars over a grade, or other kinds of rough handling.

"For leaks in the tank we have curved plates all ready to rivet on.

"Most of our men have been trained right here. They come from all kinds of occupations, and many of them had never done any mechanical work or even physical labor before. But during 1943, we managed to make 37,222 tank car repairs at Twin Oaks, and 2000 repairs were made at Meraux, Louisiana."

Meraux is one of a number of new loading installations that are a part of Sun's war effort. They receive crude oil by pipe line and barge, and are so located as to reduce substantially the rail tank car mileage. The Twin Oaks repair yard is also an unloading siding, serving the Marcus Hook refinery.

Above—View of Sun Oil Company's tank car repair yard at Twin Oaks, Pennsylvania. After being unloaded at rack to right of photo, cars are given quick repair jobs without being sent to railroad shops.

☆ ☆ ☆

Below—Right on the track, this damaged tank car gets a new body bolster cover plate at the Twin Oaks, Pennsylvania repair yards of Sun Oil Company. Quick repairs have greatly reduced "turnaround time."

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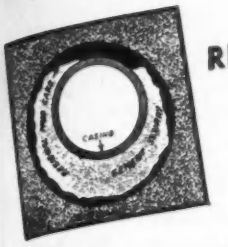
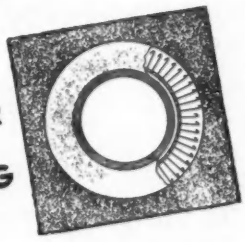
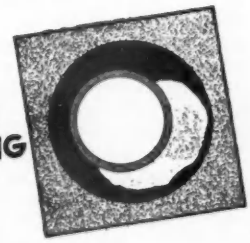
Wall Cleaning Guides Insure a Good Cement Job



REMOVE MUD CAKE



CENTER THE CASING



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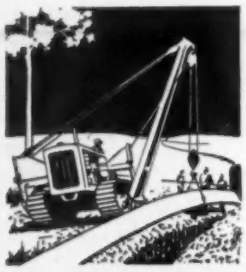


OPERATING HINTS *For Pipeliners*

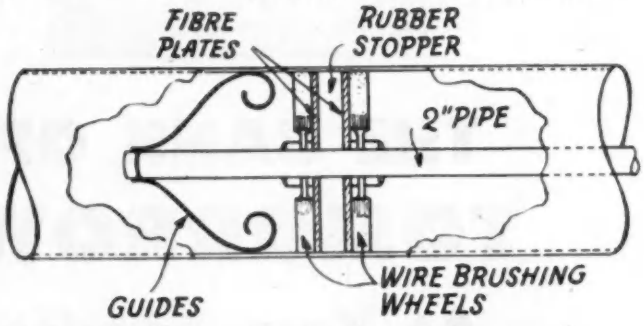
Fire-Resistant Stopper For Ruptured Gas Lines

An emergency stop for broken gas lines on which the escaping gas has caught fire has been designed and put into effective use by one company where cast iron mains are involved, and where the jacking method of closing the pipe walls together to cut off the pressure can not be applied. The method calls for a special plug or stopper which may be rammed into the open end of the line through the escaping and flaming gas.

GAS FIRE CONTROL

$5.00 is paid for each illustrated acceptable contribution. Mail to The Editor, THE OIL WEEKLY, P. O. Box 2608, Houston, Texas

for the rubber plug, afford support to center it properly, and protect it against flame damage while the unit is being inserted in the broken line. The wires of the brush, presenting sufficient metal to absorb heat before it can reach and damage the elastic plug, serve as flexible shields and are not harmed by the brief exposure to high heat as would an unprotected elastic plug or stopper.



Diagrammatic arrangement of wire brushes, plastic seal and fibre backing on unit designed for emergency closing of broken gas main.

On a 2-inch pipe stem or handle are assembled two wire brushes of the diameter suited to the mains used. Between the brushes, and backed by fibre disks slightly smaller than pipe diameter, is mounted a rubber sealing member, cut to fit closely within the line. Guides to center the device are carried on the 2-inch pipe shaft in advance of the plug.

The wire brushes tend to clear a seat

Protectors Safeguard Crosshead Slides

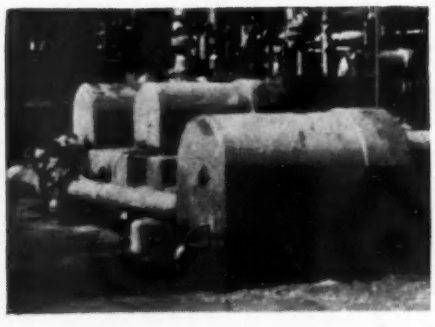
As protection for the outboard crosshead slide on high pressure hot fluid plunger pumps one operator provides substantial hoods of steel, completely enclosing the outer portion of the plunger, and preventing possible damage to the heated metal by sudden spot cooling during a rain.

PUMPING PROTECTION

The hood is formed to enclose completely the crosshead slide, resting on the concrete subbase and being free of the pump so as to permit the usual reclamation of pump wastage.

The outer end of the hood or shield is reinforced by the welded-in end, while a saddle or pad welded to the top at the pump end provides sufficient support so that the device will not bend or buckle if it is called to support the weight of the operator as he makes routine inspection or adjustment.

The inside of the base section of the hood is flanged inwardly, forming a trough or collection area for pump leakage. The fluid thus caught is drained off through a convenient line at the outer end of the hood, preventing possible fire hazard through accumulation within the hood confines.



Light tank steel hoods, formed to crosshead base, protect slide from fouling and safeguard crew.

Remote Radiator Set-up Conserves Cooling Water

On a battery of remote radiators, set outside the pump station building for better air flow and to remove the disturbing effect of the fan blast, conditions were such that no water might be wasted or lost. To provide a positive head on the system, and at the same time insure full radiators to obtain maximum cooling effect, the flow line from the engine jackets was brought in at the top of the radiators, and a riser tapped into this system to accommodate a filling and pressure unit of 5 gallons capacity, atop which was mounted a second pipe nipple and screened funnel.

COOLING WATER UNITS

To provide access to the elevated inlet a small platform and steel stair were built, enabling the attendant to reach the funnel without spilling water. On the platform, but readily visible also

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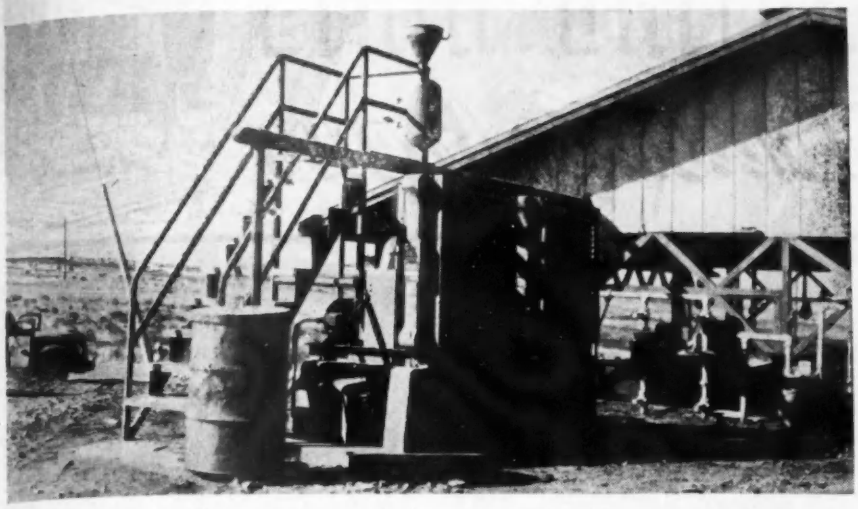


Surge chamber and refilling funnel mounted above fan-cooled radiators permit close check on makeup required, while overrun line allows salvage of treated fluid when radiator is being serviced.

from the ground, is the gauge glass on the pressure chamber, enabling a close check to be kept on the water in the system.

An extension of the return line permits diversion of the engine circulation water into a 50-gallon drum when it is necessary to work on one of the radiators or to further treat the water to remove rust or scale.

Angle Iron Extensions Form Pipe Welding Aid

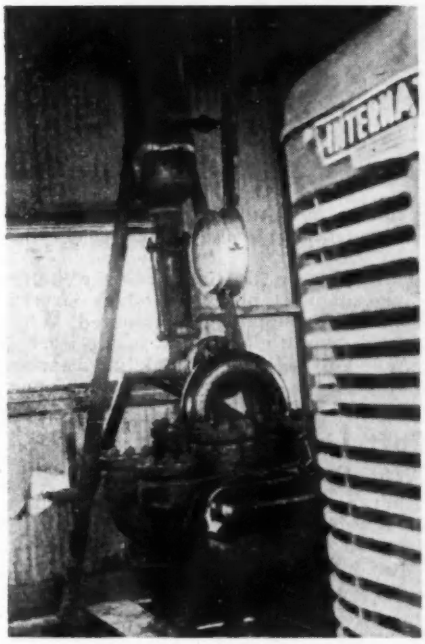
WELDING EQUIPMENT

A handy tool for aligning abutting ends of pipe without the time loss required for blocking up the joints so as to close the seam and prevent shifting during welding was made by one company welder from a heavy C-clamp. To the lower jaw and the movable anvil were welded 12-inch pieces of ¼-inch angle iron, with the open angles so placed as to oppose one another.

To align pipe within these extended jaws, it is necessary only to open the clamp, slide up to proper spacing the two ends to be welded, and bring pressure on the movable jaw with the clamp screw. The gap between the angles affords ample space for the torch or arc.

Welded to clamp jaws, these angles align pipe without restricting gap for tack-welding abutting ends.

Flexibly Connected Air Chamber Cuts Pump Load



Compression-type coupling between pump and air chamber absorbs vibration and relieves pump of offset load.

LINE SHOCK ABSORBERS

Mounting a heavy air chamber on the discharge pipe projecting from the fluid end casting of a pump places on the casting a severe strain for which it was not designed, the inverted pendulum of the chamber amplifying the vibration of the pump and setting up a racking effect which overloads the pump connection, whether of threaded or flange type.

One company eliminated this cause of damage to its gathering-line pumps by mounting the air chamber on an A-frame, welded to the front cross member of the unit skid. Connection between the pump discharge line and the chamber was through a tee set into the line, with the side outlet upward.

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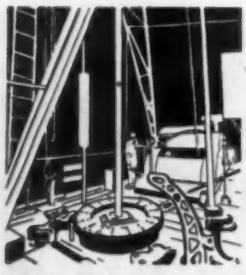
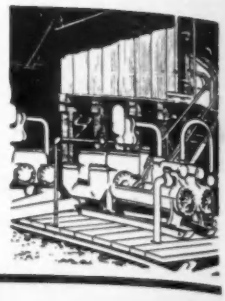
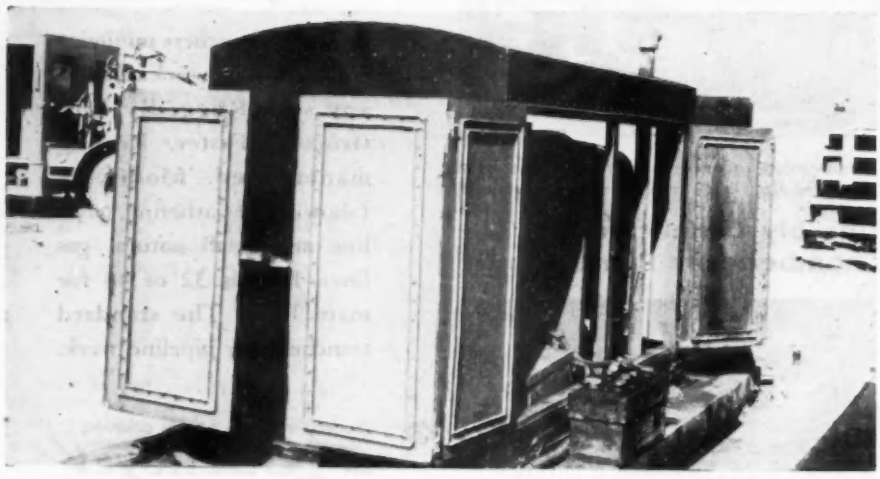


OPERATING HINTS *For Drilling Crews*



Weatherproof Housing Safeguards Generator



This enclosure, with doors hinged to provide full opening for ventilation, protects units from weather and extends service life over open-air operation while also aiding repairs.

AUXILIARY EQUIPMENT

A house to cover the generating set may be made by using discarded tank steel for the walls, sides, ends and doors. The house has an angle-iron framework attached to the sills of the generating set with a permanent roof riveted to the rafter sections. The sides and one end are constructed with swinging doors to provide access to the inside by the operators and maintenance men.

The side doors are double in section and hung with double-acting hinges for folding across the ends and locking with hasps. The thin metal of the doors is reinforced by tacking ordinary bolted tank channels near the edges so that bending or flapping is eliminated. When the doors are closed, the inside is rainproofed by a gutter moulding attached to the panels just above the door openings.

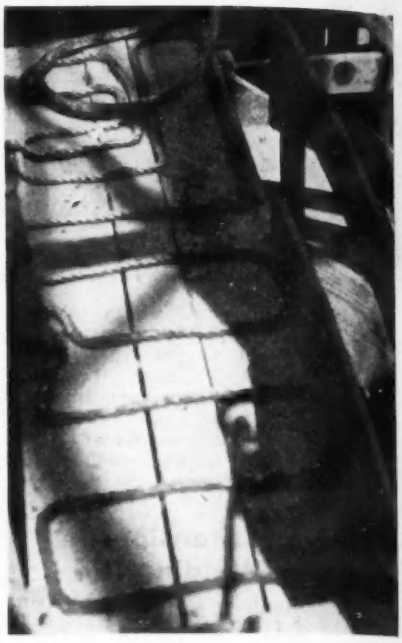
Soft Line Stripping Non-Skids Plank Walk

WALKWAY SAFETY

Scrap line, worn to the point where its tensile value has vanished, is widely used to form a gripping surface on walks where mud would otherwise form a hazard. One of the drawbacks to the use of such scrap cordage lies in the fact that it becomes slippery if wet, and thus partially defeats the purpose for which it is used.

One such walk, criss-crossed with rope to form a non-skid surface, is provided with proper drainage through the intentional spacing of the planking so as to insure cracks between boards, even when watersoaked. Any water falling on the walk thus drains through the structure, and the rope strands are not soaked by water and mud which otherwise would tend to bank against them and destroy their effectiveness.

Use of large staples, such as for barbed wire fencing, instead of nails for fastening down the rope has been found to further reduce accident hazard, and to prolong the life of the material at points of fastening.



Crack between walk planks prevents mud hazard from forming against cross ropes and extends life.

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OPERATING HINTS

This socket, flattened and bolted to cylinder studs, anchors braces against overload vibration.

RIGGING-UP DEVICE

conditions require more than the usual foundation bolting, one contractor attaches a socket to the outer cylinder heads. This socket consists of a short section of heavy pipe, one end flattened and welded to a short piece of flat steel, wide enough to span the space between adjacent cylinder studs.

Two cylinder head studs are replaced with others long enough to permit their use in anchoring the plate, while a third, across the head, is also extended to permit it to anchor the lug or ear welded to the socket so as to afford attachment there also.

This socket will accommodate the end of a transverse brace, while a hole through the pipe serves to hold the longitudinal support.

The sockets, being rigidly attached to the engine, also act as anchor for the winch line or lifting hooks when the engine is to be moved.

Pipe Joint Brake Tensions Line Feed

WIRE LINE HANDLING

When a new wire line has been brought to the rig, it is important that it be spooled tightly on the bull wheel to prevent strands from working down between inner coils when the tools are run into the hole.

Operators have tried many methods of braking the reel or holding the line tight as it pays off, but one recently developed by a Kansas operator involves simply the picking up of a joint of large diameter pipe and laying one end on the coil of line as it feeds off the reel. This pipe works across the face of the coil on the reel, being guided by the groove between adjacent wraps, and serves to put a drag on the line which prevents slack, as well as keeping the open end from swinging away from the partly unwrapped layer on the reel.

Simply laying a joint of large diameter pipe across the reel as line is paid off prevents overrunning of coils and insures proper spooling on bull wheel of drilling unit.

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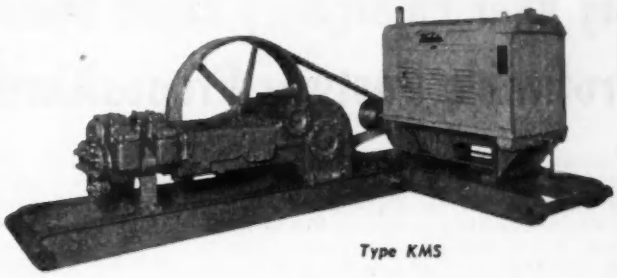

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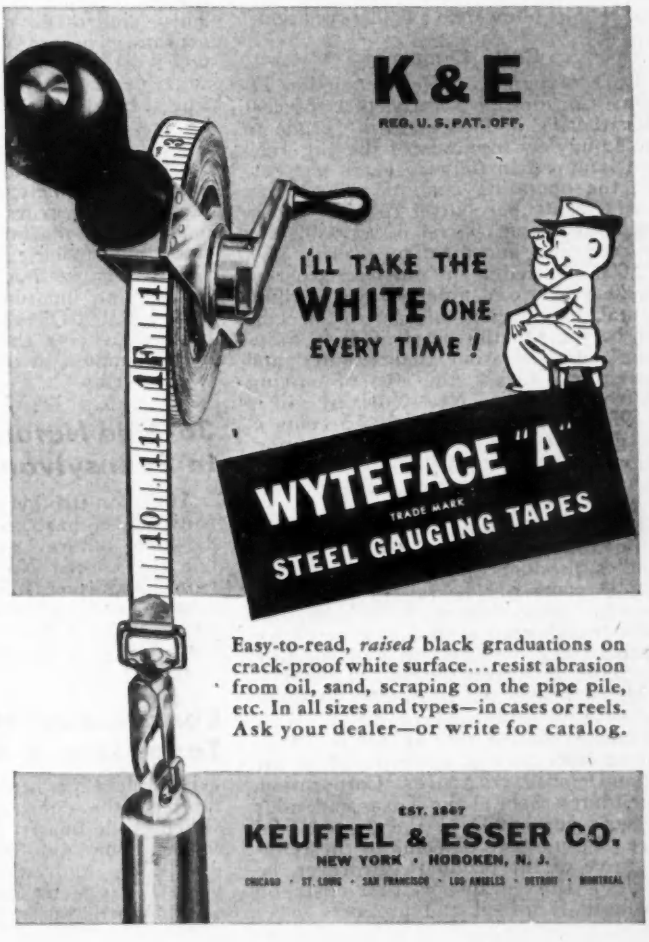

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Big War Emergency Lines Seen As Profitable Postwar Propositions

Operating experience with the government's two big pipe lines indicates that they should be marketable after the war as facilities to be conducted by private interests, it was maintained last week by Secretary of Commerce Jesse Jones.

If the Big Inch and Little Big Inch are not used for oil transport after the war it will be because industry does not want to operate them as petroleum carriers and not because they will be unable to compete with tanker service, Jones intimated.

In the first detailed analysis of the operation of the two lines to be made available, Jones disclosed that at the tanker rates for transportation the lines, on the basis of September operations, would show a profit of approximately $100,000 a day above cost of operation and reserves for amortization of the capital investment and interest.

On this basis, he said, "these pipe lines should be able to operate after the war in competition with ocean tankers and other transportation facilities for moving petroleum and petroleum products from the Southwest to the Eastern Seaboard, and it should be possible to sell the lines to private industry with reasonable allowance for depreciation."

Costs Compared

Data prepared by Reconstruction Finance Corporation showed that the cost of gathering and transporting crude to the Longview terminus of the Big Inch line is approximately 23 cents per barrel, the operating cost of transporting it is 8 cents per barrel to New York, and 7 cents per barrel is set aside for depreciation, amortization of the $77,122,000 invested in the line over a period of 20 years, and interest on working capital, making a total cost of 38 cents per barrel. On the basis of War Shipping Administration tanker rates and current rail tariffs, the cost of moving oil from Texas to New York by rail is $1.597 per barrel, of which 7.5 cents is for gathering and $1.522 for transportation, and by tanker 60.6 cents, of which 17.6 cents is for gathering and 43 cents for transportation.

The over-all capital investment in the Little Big Inch is $65,654,000, and it handles products at an operating cost of 24.3 cents per barrel, of which 0.4 cents is cost of delivery to the line, 10.6 cents transportation and 13.3 cents for depreciation, amortization and interest. The cost of transportation by rail is $1.74 per barrel and by tanker 40 cents, exclusive of gathering costs.

Jones explained that in selling crude and products at the eastern end of the lines, Defense Supplies Corporation, which buys them at the Texas end, adds 80 cents per barrel to the posted field price of crude and 65 cents to the refinery price of the products. However, he declared, since transportation costs on substantially all oil and products moving to East Coast destinations are equalized through the transportation pool, the amount of increment added to the purchase prices is "immaterial."

Delivery Figures

From the time it came into operation through September 30 of this year, Jones said, the Big Inch delivered 155,678,317 barrels of crude, 44,951,946 barrels of it at Norris City for railing to New York prior to the completion of the line to seaboard and 110,726,371 barrels delivered direct to the coast. To the end of September the Little Big Inch handled 37,400,945 barrels of products, delivering 183,189 barrels at Norris City prior to the completion of the Eastern leg and running 37,217,734 barrels all the way.

On the basis of September operations, it was shown, the Big Inch line is returning a gross profit of approximately $134,692 a day and the Little Big Inch 84,493, a total of $219,185. These grosses, however, are cut sharply by the transportation-equalization plan, under which between 21 and 22 cents per barrel on crude and 23 to 25 cents on products are returned to buyers of the oil, but the net return is close to $100,000 a day. These figures do not include the compensatory program for rail shipments, now costing about $500,000 to $600,000 a day, which is practically entirely defrayed by the increases in price allowed by the OPA which are contributed to the fund by the companies.

Until recently, it was said, the government was between $200,000,000 and $250,000,0 in arrears on its compensatory payments to the industry, but is understood now to be catching up gradually.

Any organization acquiring the $142,766,00 pipe line duo would find itself with a $21,904,000 inventory within the lines, that being the value set by Jones on the amount of oil required to fill the two systems.

36-Mile Natural Gas Line In Pennsylvania Complete

Anderson Brothers Construction Company, Tulsa, has completed 36.2 miles of 8¾-inch natural gas, pressure-welded line for United Natural Gas Company from its Mineral Station in Venango County, Pennsylvania, to the Manufacturing Light & Heat Company's Elwood City station in Beaver County, Pennsylvania.

Construction of Six-Mile Texas Line Is Authorized

Humble Pipe Line Company has authorized the construction of a 6-mile, 4-inch crude line from the Stanolind Oil & Gas Company's Midland Farms four-well pool, Andrews County sector of West Texas, to its Means-North Cowden 6-inch shuttle line.

63-Mile Line Proposed From West Texas Field

Gulf Refining Company proposes to construct a 63-mile, 8-inch welded pipe line from the Keystone-Ellenburger field, Winkler County, Texas, via the Goldsmith field to its West Texas tank farm and terminal at Midland.

The line will handle high-gravity sweet crude oil produced and purchased by the company in the Keystone area and also will accept delivery in the Goldsmith area for the sweet crude gathered by the Standish Pipe Line Company, Phillips Petroleum Company subsidiary, in the Embar field, Andrews County.

Projected development of the Keystone field's sweet crude reserve will eventually exceed the capacity of the proposed line, which will traverse the multi-pay sweet crude area in prospect for western Ector County. Gulf Refining Company is paying a top price of $1.25 per barrel for Ellenburger production in the Keystone area, and its gatherings are handled on a common carrier basis by Magnolia Pipe Line Company in order to segregate this oil from the former's regular Winkler County runs.

Contract to Lay 24.7-Mile Texas Line Is Awarded

J. R. Horrigan Construction Company, Houston, has been awarded a contract to lay 24.7 miles of 10¾-inch natural gas line for Glen McCarthy, Houston.

Capacity will be 65,000,000 cubic feet per day. Seamless 28-pound pipe is to be used with all joints welded. Originating in the Winnie area, the line will connect with the present McCarthy line near Beaumont, Texas. Construction was scheduled to start November 20 and completion is due before January 1.

FPC to Hear Pittsburgh Firm's Request for Line

The Federal Power Commission has scheduled a hearing in Washington December 12 on consolidated applications of the Hope Natural Gas Company, Pittsburgh, for authority to construct additional facilities and to operate 9.4 miles of 12-inch high-pressure line between the Marts Compressor and Fink Compressor stations.

Wilbarger County, Texas, Pipe Line Extension Planned

The Bell-Western Corporation has completed survey and purchased site for a pumping station for an extension of its pipe line from Fargo in Wilbarger County, Texas, to a new oil pool in the same county, Block 11, H. & T. C. Survey, which was recently opened by the Fain-McGaha Oil Corporation of Wichita Falls, Texas.

The extension will consist of a 4½-inch line from Bell's Parker station four miles northwesterly to the proposed pump station on the Brooks farm. Authority has been requested to extend the line from the Brooks station west to Quanah to provide an outlet should additional production be developed by tests now drilling.

Stocks Decline Despite Gains In Daily Average Production and Runs to Stills

Stocks of crude oil, gasoline and distillate declined during the week of November 11 despite gains in daily average production of crude and increased runs to stills over the previous week.

The over-all situation as compared with that of a year ago is characterized by continued increases in output, or production as the case may be. In percentages these gains are as follows: Daily average production of crude, 6.5 percent; runs to stills, 11.9 percent; weekly production of gasoline, 18.1 percent; weekly production of residual fuels, 14 percent. The one exception is production of gasoil and distillate, which shows a 2.7 percent decline against last year.

Stocks of crude oil have declined 5.9 percent during the year, emphasizing the strength of the demand for all kinds of refined products to meet military and civilian needs.

Runs to stills amounting to 11.9 percent more than last year have resulted in a gain in weekly production of gasoline, and rationing and control of the use of gasoline have made it possible to increase stocks of this product 14.2 percent during the year. Likewise stocks of gasoil and distillate have increased 6.8 percent, and residual fuels, 2.5 percent.

Refinery operations were estimated at 94.7 percent of capacity for the week, against 93.1 percent last week.

Daily average crude production was 4,727,000 barrels, a gain of 8000 barrels daily over the previous week, the gain being distributed over a number of states.

Maximum Price Regulation Changes Announced by OPA

Changes in Maximum Price Regulation 88 were announced by the OPA November 11, including the following which will be applicable to the industry generally:

Competitive bidders for government orders who do not have dollar-and-cent maximum prices are required to attach their own maximum prices to their bids.

When crude oil is sold for use as fuel oil in oil and gas field operations, and when crude oil is sold by a producer to anyone except to an ultimate consumer, ceilings will be determined under the crude oil regulation (MPR 436). Sales of crude oil to a processor for use as gas enrichment of oil, however, will have ceilings determined under MPR 88.

A provision is added enabling the administrator to grant the status of "eligible broker" or "eligible marketer" to a broker or marketer who cannot qualify under the existing standards but who can show good cause why he should have such status.

☆

Kansas Hearing

The Kansas State Corporation Commission will consider market demands and fix the state and pool allowables for December at 10 a.m., November 24, in Wichita.

J. H. WOODS has resigned as district manager for Seaboard Oil Company at Evansville, Indiana, to join the land department of the Republic Natural Gas Company at Dallas.

Two Leave PAW

David M. Logan, petroleum production specialist, and Milan Maravich, statistician, have resigned from the Tulsa office of PAW which now has a staff of five men and five women. Logan has returned to Okmulgee as an independent oil operator, and Maravich is with the land and geological department of the Stanolind Oil & Gas Company in Kansas.

☆

FRANCIS A. CALLERY, San Diego, California, aviation executive and formerly an oil producer in Oklahoma, and associates have launched an oil development program in West and Southwest Texas. Harry Hurt, an associate, formerly of New York, is in charge of operations with headquarters in the Commercial-Standard Building, Fort Worth.

Trends of Operations and Changes in Stocks

Figures on crude stocks are from Bureau of Mines weekly reports; all others from American Petroleum Institute weekly reports, which are estimates on Bureau of Mines basis.

(All figures in thousands of barrels—add 000)

HIGHS AND LOWS OF RECENT YEARS

ITEM	Crude Oil Prod. Barrels Daily	Crude Oil Prod. Week Ended	Runs to Stills Barrels Daily	Runs to Stills Week Ended	Crude Stocks Barrels	Crude Stocks Week Ended	Gasoline Stocks Barrels	Gasoline Stocks Week Ended	Gasoil and Distillate Stocks Barrels	Gasoil and Distillate Stocks Week Ended	Residual Fuel Oil Stocks Barrels	Residual Fuel Oil Stocks Week Ended
Highs:												
1941	4,337	11-22	4,120	10-18	266,187	3-29	99,727	3-29	[1]54,983	11-15	102,448	1- 4
1942	4,337	2- 7	3,961	1- 3	263,208	3-28	[1]109,281	3-14	47,861	11-14	95,857	1- 3
1943	4,436	11-13	4,331	12- 4	245,752	5-29	94,159	3-20	47,187	11-27	72,881	1- 2
1944	[1]4,762	9-30	[1]4,775	9-30	240,992	1- 1	89,162	4- 1	48,863	10-28	64,644	10- 7
Lows:												
1939	[3]1,601	8-26	3,125	2-18	[2]229,127	10-12	71,152	10- 7	20,722	4-15	105,397	4- 8
1941	3,364	1-11	3,490	1-18	240,399	11-15	79,923	10- 4	28,382	4-12	90,914	7-12
1942	3,297	7- 4	3,393	5-23	231,896	12-12	75,934	12- 5	29,240	4-25	72,962	12-26
1943	3,821	1- 9	3,579	3-13	232,191	1- 9	68,182	10-16	30,732	4- 3	57,596	12-25
1944	4,357	1- 1	4,228	2-12	[4]220,623	9- 9	76,302	1- 1	30,232	4-29	49,737	3-18

TRENDS OF 1943 AND 1944

Trends in Week Ended:	Crude Oil Production Daily	Crude Oil Runs to Stills Daily	Crude Oil Stocks Week End	Gasoline Production Weekly	Gasoline Stocks Week End	Gasoil and Distillate Production Weekly	Gasoil and Distillate Stocks Week End	Residual Fuel Production Weekly	Residual Fuel Stocks Week End
1943:									
January 2	3,871	3,734	233,938	10,957	82,420	4,285	42,913	7,683	72,881
January 30	3,826	3,698	233,863	10,339	88,830	3,888	37,057	7,452	70,763
February 27	3,873	3,709	235,217	10,566	93,157	4,230	32,939	7,839	70,140
March 27	3,896	3,742	239,126	10,231	94,079	3,541	30,980	8,018	67,938
April 24	3,913	3,737	242,035	10,583	91,001	3,954	31,142	8,168	67,455
May 29	3,970	3,679	245,752	10,656	83,937	3,798	32,274	7,672	67,682
June 26	3,955	4,015	242,657	11,092	79,589	3,876	34,044	8,126	67,960
July 31	4,133	3,788	238,420	11,127	74,977	3,765	36,363	8,478	66,877
August 28	4,196	4,227	236,170	12,420	72,525	4,351	37,928	8,732	67,250
September 25	3,344	4,156	233,013	12,206	70,024	4,608	40,328	8,560	66,659
October 30	4,383	4,176	247,219	12,813	69,297	4,642	44,591	7,968	63,833
November 27	4,414	4,261	239,761	12,638	69,980	4,379	46,187	8,633	62,143
December 25	4,363	4,185	241,310	12,597	74,024	4,457	43,791	8,689	57,596
1944:									
January 1	4,357	4,453	240,992	13,192	76,302	4,575	42,310	9,141	57,330
January 29	4,409	4,359	240,251	13,427	81,085	4,054	37,266	8,889	52,857
February 26	4,423	4,377	237,137	13,183	85,248	4,558	33,766	8,952	51,387
March 25	4,385	4,443	236,285	13,362	87,287	4,979	31,319	9,013	51,669
April 1	4,383	4,435	234,667	13,824	89,162	4,450	30,530	8,367	51,326
April 29	4,431	4,300	235,342	13,126	88,462	4,284	30,236	8,398	49,985
May 27	4,514	4,532	234,423	13,502	86,468	4,702	32,035	8,568	49,812
July 1	4,587	4,638	228,860	14,052	83,559	4,496	35,360	8,872	52,235
July 29	4,608	4,627	225,112	14,115	82,665	4,833	38,135	8,900	56,280
August 26	4,667	4,698	222,931	14,112	80,740	4,566	41,453	8,680	59,839
September 30	[1]4,762	[1]4,775	222,393	14,494	78,028	4,622	45,329	9,292	64,226
October 28	4,740	4,658	223,235	14,117	79,058	4,772	48,705	8,985	64,382
November 4	4,719	4,570	222,894	14,152	78,409	4,569	48,477	8,570	63,444
Nov. 11, 1944	**4,727**	**4,650**	.....	**14,464**	**78,091**	**4,492**	**48,259**	**9,431**	**63,999**
Nov. 13, 1943	4,436	4,154	236,937	12,243	68,344	4,617	45,296	8,279	62,409
Change:									
In week	+8	+80	—341	+312	—318	—77	—218	+861	+555
In year	+291	+496	—14,043	+2,221	+9,747	—125	+2,963	+1,152	+1,590
In year	+6.5%	+11.9%	—5.9%	+18.1%	+14.2%	—2.7%	+6.8%	+14.0%	+2.5%

[1] All time peak. [2] Lowest between January, 1922 and July 1, 1944. [3] Lowest since October, 1922, due to shutdown of six Mid-Continent states. [4] Lowest since December, 1921. [5] Stocks, November 6, 1943.

U. S. Field Operations

Oklahoma

West Trend Well Peps Up West Moore Pool Activity

J. E. Crosbie, Inc., and Warren Petroleum Company's Stotts 1, NE NE SE 30-10n-3w, flowed 646 barrels of 39-gravity oil through 3/8-inch choke in 24 hours to pep up West Moore pool activity which suffered setbacks recently from dry holes on the east side of the play.

The Stotts well trends the pool to the west and is producing from deep Wilcox sand at 8690-8723 feet with 3 new locations about to be spotted. The 40-acre spacing pattern adopted for the pool may be amended to permit Mid-Continent Petroleum Corporation to drill on a 10-acre offset tract to the Stotts producer. On the east side of the pool Mid-Continent set pipe at 8879 feet in Tubbs 4, NE SE SE 29-10n-3w, topped Wilcox sand at 8847 feet, drilled to 8880 feet and was preparing to test. In South Moore, Mid-Continent washed in Wesermier 2, NE NW SW 26-10n-3w, north offset to the discovery well, with good oil flow reported from Wilcox sand at 8819-45 feet. The well checked high with the discovery indicating better wells on the north end of the structure still undefined.

West Edmond: Operators are checking production possibilities in the basal Hunton lime zone. Sinclair Prairie Oil Company's O'Brien 1, CNE NW 9-14n-4w, northeast part of the pool, flowed 40 barrels of oil an hour through 1-inch choke after acidizing the Chimney Hill section. Stanolind Oil & Gas Company's Pauly 1, CNW NW 27-14n-4w, flowed 216 barrels of oil in 16 hours from the Chimney Hill section but the flow was killed and well plugged back to Bois D'Arc for completion. It is unlikely that wells will be produced from basal Hunton until the Bois D'Arc section is exhausted.

Three miles north of production in Logan County, Phillips Petroleum Company et al's Dublin 1, CNE NE 18-15n-4w, was drilling "tight" below 6740 feet, probably in Hunton lime. Bartlesville sand was topped at 6390 feet.

With 226 wells completed, operators estimate the 300-well mark will be passed by the end of the year. There are also five Bartlesville sand producers and one gas well in the pool.

Garvin County: A new shallow Pennsylvanian sand was picked up by Ohio Oil Company in the East Pauls Valley pool as Feaster 1, NE NE NE 13-3n-1e, tested 15-20,000,000 cubic feet of gas through drill stem at 2874-90 feet, about 60 feet higher than the McKinney sand which gave the pool its first oil some months ago. Operator was drilling to the McLish sand.

Meanwhile, drill-stem test of the McLish (Ordovician) at The Texas Company's Byington 1, NE NW NW 18-3n-2e, from 3242-3571 feet, with pipe set at 3242 feet, recovered salt water and operator was plugging back for completion in the Pennsylvanian McKinney (2936-47 feet) or Burns sands (2980-3004 feet).

McClain County: The Carter Oil Company's Lamar Ranch 1, CNE SW 28-8n-3w, closely watched Anadarko Basin deep wildcat test near Blanchard, was reported drilling in Hunton lime below 10,238 feet after topping the zone at 9978 feet. McBride 1, CSE NW 9-7n-3w, Washington area, was drilling below 5450 feet.

Tulsa County: Big Lime (Mississippian) production has been developed in the Sands Springs area as A. W. Swift et al's Anthis 3, NE SW SW 13-19n-10e, flowed 200 barrels of oil from 2 feet of pay topped at 1175 feet. Only two joints of surface pipe were set when the well slopped over and operators were running casing for final test. The strike is believed to be on the south side of a fairly large structure. Wells have been producing from the Bartlesville sand and this is the first important production found in the Big Lime.

Logan County: F. C. Hall et al spud in Perdue 1, SE SE SW 24-19n-4w, east of the Marshall pool, for a 5000-foot Layton sand test. The wildcat is on a 2000-acre block supported by Gulf Oil Corporation, Magnolia Petroleum Company and Vickers Petroleum Company through lease purchases. Gulf holds a block just north of the test.

In their first Layton sand test in the Crescent pool, Fox & Fox completed Herron 1, CNE SE 23-17n-4w, which flowed 176 barrels of oil daily on initial test. Sand was topped at 4886 and drilled to total depth of 4925 feet. Locations were staked for Herron 2, CSE SE 23-17n-4w, and Hudson 1, CNW SE 26-17n-4w.

Payne County: V. L. Crowell et al are moving in for an important wildcat on a block south of Glencoe which lies between 2 dry holes drilled within a year. Price 1 is in SW SE NW 9-20n-4e, on leases assembled originally by Robert A. Arnold of Stillwater, Oklahoma. A number of major oil companies and strong independents hold close-in acreage.

Stephens County: The Texas Company's Bateman 1, SW NW NE 21-2n-8w, flowed 72 barrels of oil and some water through 1-inch tubing choke on 24-hour test after squeeze job at 6189-6235 feet and then ran into trouble, losing swab and dropping tubing while fishing for swab. Fishing continues for swab and tubing at plug-back total depth of 6189 feet.

Cleveland County: Paying between $25 and $50 an acre, Shell Oil Company has assembled a block of approximately

Wells Completed in United States in Week Ended November 18, 1944

Data preliminary and subject to revision. Revised and more complete data on all completions shown in monthly summary of drilling, published in second issue of each month. More detailed data on wildcats published in third issue of each month.

State or District	FIELD COMPLETIONS: New Wells *Oil	Gas	†Input	Dry	Total	Old Wells Deepened	WILDCAT COMPLETIONS *Oil	Gas	Dry	Total	ALL COMPLETIONS: This Week	Last Week	Cumulative: This Year	Last Year
Alabama	....	....	....	....	....	....	....	....	....	....	....	....	34	2
Arizona	....	....	....	....	....	....	....	....	....	....	....	....	6	5
Arkansas	5	....	....	1	6	....	....	....	2	2	8	1	205	227
California	23	....	....	....	23	....	....	....	3	3	26	41	1,820	1,282
Colorado	....	....	....	....	....	....	....	....	....	....	....	....	26	24
Florida	....	....	....	....	....	....	....	....	....	....	....	....	3	5
Georgia	....	....	....	....	....	....	....	....	....	....	....	....	7	4
Illinois	33	....	1	8	42	2	....	....	8	8	52	44	1,759	1,596
Indiana	4	....	....	3	7	2	....	....	4	4	13	13	313	249
Iowa	....	....	....	....	....	....	....	....	....	....	....	....	2	3
Kansas	17	3	....	11	31	1	....	....	10	10	42	28	1,519	1,532
Kentucky	5	....	....	9	14	....	1	....	....	1	15	13	681	370
Louisiana	9	4	....	2	15	....	1	....	1	2	17	22	685	577
North Louisiana	2	3	....	1	6	....	....	....	....	....	6	6	240	270
South Louisiana	7	1	....	1	9	....	1	....	1	2	11	16	445	307
Michigan	....	....	....	....	....	....	....	....	....	....	....	14	599	525
Mississippi	5	....	....	....	5	....	....	....	4	4	9	3	182	85
Missouri	....	....	....	....	....	....	....	....	....	....	....	1	39	25
Montana	....	....	....	....	....	....	....	....	....	....	....	....	292	196
Nebraska	....	....	....	....	....	....	....	....	....	....	....	....	11	37
New Mexico	4	....	....	1	5	....	....	....	2	2	7	9	368	237
New York	10	....	15	....	25	....	....	....	....	....	25	25	1,111	1,100
Ohio	3	9	....	4	16	....	....	....	....	....	16	10	771	697
Oklahoma	31	....	1	3	35	1	1	....	5	6	42	47	1,654	1,282
Pennsylvania	27	7	15	2	51	....	....	....	....	....	51	54	2,576	2,248
Tennessee	....	....	....	....	....	....	....	....	....	....	....	....	9	6
Texas	74	7	1	18	100	3	2	1	19	22	125	132	5,420	3,750
E.Tex.Bor. Co.'s	....	....	....	....	....	....	....	....	....	....	....	....	31	18
E. Texas Field	....	....	....	....	....	....	....	....	....	....	....	....	3	5
Rest of E. Texas	....	1	....	1	2	....	1	....	2	3	5	5	255	216
North Texas	16	....	1	11	28	....	....	....	5	5	33	24	1,239	935
W. Central Tex.	....	....	....	....	....	1	....	....	....	....	1	18	364	340
West Texas	33	1	....	4	38	1	....	....	2	2	41	38	1,444	832
Tex. Panhandle	7	1	....	1	9	....	....	....	....	....	9	10	240	174
G. Coast, Upper	10	2	....	1	13	....	....	1	5	6	19	6	529	288
G. Coast, Lower	6	2	....	....	8	....	1	....	2	3	11	17	825	559
Southwest Texas	2	....	....	....	2	1	....	....	1	1	4	12	397	327
S. Central Tex.	....	....	....	....	....	....	....	....	2	2	2	2	93	56
Utah	....	....	....	....	....	....	....	....	....	....	....	....	1	....
West Virginia	2	20	....	2	24	....	....	....	....	....	24	20	843	606
Wyoming	....	....	....	....	....	....	....	....	....	....	....	....	148	109
Total U. S.	252	50	33	64	399	9	5	1	58	64	472	477	21,084	16,754

* Includes distillate wells. † Includes salt water disposal wells.

1800 acres in Twp. 6n-1w, north of the block where Magnolia is rigging up Anneler 1, CSE NE 26-6n-1w. Companies interested in the Wilcox sand prospects are paying fairly high prices for wildcat acreage in Twp. 6n-1e and 6n-1w, with a wildcat announecd in each township and others under consideration in the areas between Lexington and the Pottawatomie County line.

Much Activity Promised on Nemaha Ridge's East Flank

While emphasis during the last few months has been placed on deep drilling west of the Nemaha Ridge, Oklahoma oil operators are not neglecting the possibilities along the east flank of the Ridge and present indications point to a widespread wildcatting campaign that will continue into the spring. Hopes for production east of the Ridge, where most of Oklahoma's oil has been produced, are enhanced as a result of extensive development in the Layton sand zone on the east side of the Crescent pool, Logan County, and several good strikes in the Bartlesville zone from South Guthrie to Oklahoma City. Lease block and concentrations follow an almost unbroken trend from Oklahoma City north to Garfield County and a number of important wildcats are slated for drilling during the next six months.

Kansas

Brown County Commercial Production Is Established

First commercial production for Brown County was definitely established with completion of Clifton Gall's Livengood 1, NE NW SW 3-1s-15e, 5 miles southwest of the Falls City, Nebraska, pool After treating with 500 gallons acid the well was finaled as a 100-barrel daily pumper of 27-gravity oil from Hunton lime at 2578-90 feet. On the heels of the completion came the announcement that Ohio Oil Company had farmed out part of its Sabetha block, Nemaha County, about 8 miles southwest of the new discovery, on which it drilled a dry Hunton well early this year, to Fred Culpepper et al who staked Lamparter 1, SW SE 3-2s-14e, ¼-mile southeast of Ohio's dry hole, with support from Phillips Petroleum Company and Amerada Petroleum Corporation.

Stafford County: Phillips opened a new Arbuckle lime pool 5 miles northwest of the Zenith field at Vivian 1, NE NE SE 12-23s-12w, which, after acidizing with 500 gallons, was given a pumping potential of 350 barrels daily. Arbuckle was topped at 3679 feet and saturated formation was drilled to total depth of 3684 feet. The discovery is in the center of a 1280-acre block.

McPherson County: Three miles northwest of the Henne pool, Williams & Morine's Henne 1, SW SW SW 4-17s-1w, opened a new area. Topping Mississippi chat at 2635 feet and drilled to 2645 feet, total depth, it pumped 75 barrels of oil daily on initial test.

Russell County: Coralena Oil Company has a possible pool opener 1½ miles southwest of Gorham as Alley 1, SE SW NE 29-14s-15w, after acidizing with 4800 gallons, swabbed 14 barrels a day from Lansing lime topped at 3017 feet after a plug-back from dry Arbuckle topped at 3282 feet and drilled to 3294 feet, total depth. Testing continues.

Barber County: Lion Oil Refining Company was preparing to test Allen 1, NW NE NE 2-30s-14w, wildcat about a mile west of the Coats pool after 2 good drill-stem test shows. From 4091-94 feet with tool open 15 minutes, operator recovered 90 feet of oil-cut mud. Topping Viola at 4437 feet, drill-stem test at 4499-4525 feet with tool open 10 minutes recovered gas in 7 minutes plus 30 feet of oil and 90 feet of mud and water. Casing was set at 4610 feet, total depth.

During a week's time Kansas reported 87 drilling wildcats compared with 76 for the same period last year. Thirty-six pool wells were finaled in the week, including 17 oil producers with initial potential of 13,050 barrels per day, two gassers with a capacity of 47,500,000 feet daily and 17 dry holes. Fifteen wildcats were completed of which two were discoveries.

Cheyenne County: Another wildcat test on the heels of a dry hole drilled recently by Sinclair Prairie Oil Company near the Colorado line, may be announced as a result of leasing activity by F. V. Wilder, Tulsa, who is assembling a block in township 2s-41w and 4s-41w, near Sinclair Prairie and Stanolind Oil & Gas Company holdings. In township 4s-39w, Champlin Refining Company, Enid, Oklahoma, holds an acreage spread, and Ohio Oil Company, Mid-Continent Petroleum Corporation and Cities Service Oil Company are also playing the area.

Increased Production Seen If 40-Acre Limit Dropped

Directors of the Kansas Independent Oil & Gas Association have approved and forwarded to PAW headquarters at Washington, D. C., a resolution urging relaxing of the 40-acre well spacing rule in that state to permit the drilling of 20-acre locations.

Kansas operators state that there are many areas in the state where 20-acre spacing is essential. Because of the 40-acre well spacing many wildcats have failed which otherwise would have produced due to the limited areas of many Kansas structures. Operators also declare the 40-acre pattern has been wasteful in material with thousands of feet of drill pipe worn out in drilling unjustified wildcat dry holes and thousands of tons of steel in the form of surface casing abandoned in the ventures. Operators believe that Kansas production would almost double within a few months if the 40-acre well spacing pattern was relaxed to permit closer drilling.

Awarded Service Pin

R. E. Young, manager of pipe lines for The Pure Oil Pipe Line Company's southwest division, was presented with a 35-year service pin by D. D. Irwin of Chicago, president, at a dinner in the Tulsa Club, Tulsa. Other guests were district pipe line superintendents and production managers for the company.

☆

E. R. ALBERT, JR., division engineer for Baroid Sales Company, was the principal speaker before the Mid-Continent section, A.I.M.M.E., at Tulsa. His subject, illustrated with slides, was "Influence of Drilling Practices on Drilling Mud Programs."

West Texas

North Monahans Field Has First Important Extension

The Texas Company's Hogg 1, 1¾ miles northwest of the North Monahans field discovery, Winkler County, provided the first important extension in flowing 246 barrels of oil on 9-hour test after using 1000 gallons of acid through Clear Fork perforations at 6100-40 feet, having drilled through the pay to 6287 feet. This outpost is lower structurally than the 3 offset producers on Stanolind Oil & Gas Company's discovery block, but is producing from a high zone in the Clear Fork.

Sinclair Prairie Oil Company's Walton 5-A, ¼ mile west of deep production in the Keystone field, was drilling pay at 9420 feet, having entered the Ellenburger at 9160 feet, being 4 feet low. Continental Oil Company's Walton 1-D, ¼ mile west, has established the sharp structural dip that was anticipated on the west in checking 650 feet low on the Simpson, and was drilling at 9120 feet. Sun Oil Company's Keystone 2, 2 miles north by west of production, was changing mud at 10,100 feet in Simpson, and is more than 1000 feet low, but is assured of production from the Silurian.

Ector County: Shell Oil Company and Cities Service Oil Company's T. P. Land Trust 1, most important active wildcat in the Permian Basin from the standpoint of new crude reserves and setting in motion a big drilling program, was idle at 10,019 feet in an unidentified formation. It is most likely in the Ellenburger, for at this level it is the same depth below the Devonian, topped at 7860 feet and about 690 feet high, as the Ellenburger producing zone in the Wheeler field, 4 miles Southwest. This wildcat passed up 3 flowing oil zones in lower Permian and below. Six additional tests are under way, or awaiting rigs, including The Texas Company's T. P. Land Trust 1-B, 4 miles southeast, which was drilling lime at 6910 feet. Ellenburger completions will cost $250,000, and require 6 months drilling time.

Hockley County: The Texas Company's Montgomery 1, Labor 19, League 70, Val Verde County School Lands and 7 miles north of the Slaughter field, revealed marked flattening of the San Andres to the north of the district's biggest field in entering the San Andres at 3800 feet, with elevation of 3600 feet, and was showing 10,000 feet of gas daily in drilling zone at 4751-60 feet with cable tools.

Cochran County: Honolulu Oil Corporation's Hudson 1-9, 3 miles southwest of the Slaughter field, is rated as a major extension, or pool opener, in filling 700 feet with oil from San Andres at 5070-87 feet, using tools since landing 5½-inch at 5046 feet. Deepening established first salt water at 5124 feet and sulphur water at 5147-53 feet. It will be plugged back for acid treatment.

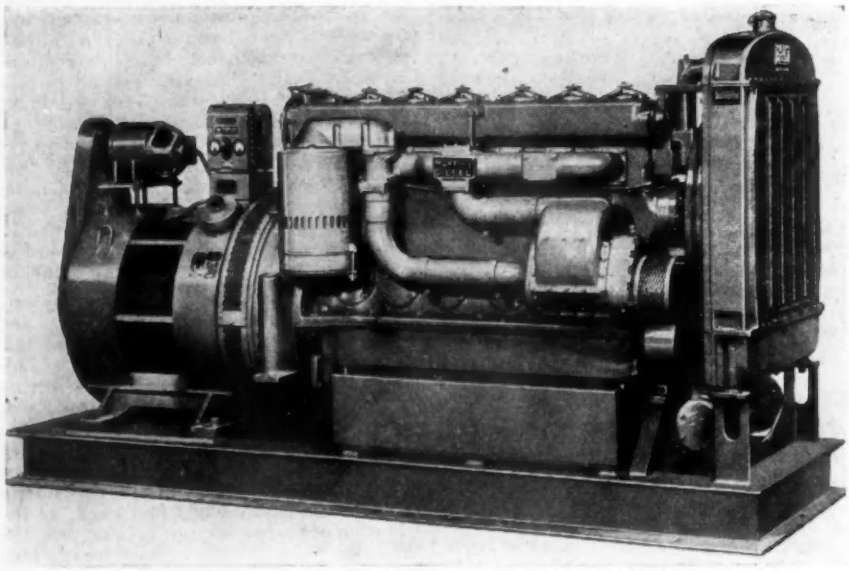
Yoakum County: Skelly Oil Company's Hodges 1, C NW NW Section 446, Block D, 5½ miles north by west of the West pool, nearest production, swabbed at rate of 100 barrels daily, including acid residue, after using 2000 gallons of acid through San Andres perforations at 5250-70 feet. It will make a small pumper. This wildcat entered

the San Andres at 4530 feet with elevation of 3704 feet, and was drilled to 7717 feet, having no shows in the Clear Fork.

North Basin: Seaboard Oil Company and Stanolind Oil & Gas Company's Cravens 1, North Central Lubbock County wildcat that passed up promising oil show in Clear Fork at 6050-6116 feet, was drilling dry lime at 6490 feet. It is 14 miles east by south of the Lamb County discovery by Humble Oil & Refining Company's Jackson 1, which swabbed 12½ barrels oil hourly via tubing from broken Clear Fork saturation at 5352-6050 feet after plugging back from granite at 7191 feet. The latter will be swabbed through casing to try for steady flow. Hunt Oil Company is starting Foust 1, C SE NE Section 43, Block 1, 5 miles to north. Woodley Petroleum Company's Bird 1, 7½ miles northwest of Jackson strike, was drilling dry lime at 6590 feet in Clear Fork, topped at 5170 feet. Magnolia Petroleum Company's Johnson 1, Lubbock County Ordovician prospect and 5¾ miles northeast of the Stennett 1-well pool, was drilling dry lime at 7080 feet, having passed up favorable showing at 6250-6311 feet.

Andrews County: Magnolia Petroleum Company's University 1-11, a mile south by east of the most easterly well in Fullerton field, entered the Fullerton, or Tubb sand at 6630 feet, 61 feet low, and tested 5 barrels of water hourly at 7044 feet, being 25 feet above expected water table. Test will be made of possibe pay, topped at 6910 feet, down to 7000 feet, then if results are negative it will be carried to the Devonian. The same company's Ralph 1-A, mile west outpost, logged its first oil stain in Clear Fork at 6740 feet with elevation of 3344 feet. First drill-stem test at 6738-6843 feet proved dry, and second at 7009-80 feet returned 30 feet of slightly oil-cut mud.

Ordovician Wildcats: Humble Oil & Refining Company's State Bank 1, Pecos County, 6 miles southeast of the Heiner deep area, was drilling at 8290 feet in Ellenburger, topped at 8245 feet, with elevation of 2604 feet, and proved dry when tester used at 8244-82 feet. This prospect showed for a flowing well from unidentified lime at 5463 feet, but exhausted it after re-acidizing. Magnolia Petroleum Company's Hart-State 1, 2 miles southwest of the Abell field, was drilling Basal Simpson at 6470 feet, having temporarily passed up probable production in the Waddell. In the Iatan-East Howard field, Mitchell County, Magnolia Petroleum Company's Foster 22 entered Ellenburger at 8415 feet with elevation of 2289 feet, being considerably low to 3 previous Ellenburger tests for county, and was making drill-stem test at 8417 feet.



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North Texas

Farmer Pool Test May Be Mississippian Lime Producer

Standard Oil Company of Ohio's Garvey 1-C, SWc of TE&L Co., Section 1802 and 9700 feet west of the company's bend production in the Farmer pool, is a prospective producer in the Mississippian Lime through having recovered 200 feet of oil-cut mud on 12-minute test at 5098-115 feet, while second test at 5200 feet yielded gas to surface in 10 minutes and 150 feet of oil-cut mud was recovered. Garvey 1-C entered the Bend at 4399 feet, being 7 feet high to nearest Bend production and topped the new pay at 5095 feet.

Wichita County: A new Ellenburger producing area within the expansive K-M-A Strawn field has been established by The Texas Company's First National Company (Kemp-Allen 27, NEc S½ Lot 15, Block 26, 3⅓ miles northeast of nearest Ellenburger production and 1½ miles north by east of the Strawn discovery, which drilled 1140 feet of barren Ellenburger to 5430 feet. The new deep strike entered Ellenburger at 4094 feet and was flowing 75 to 100 barrels daily while cleaning out gravel pack used for 70-quart nitro shot at 4114-57 feet. In the Madden 1-well pool, Panhandle Refining Company's Madden 3, ¼ mile southeast of its discovery, entered Bend at 5072 feet, 9 feet low. Drill stem test of saturation to 5090 feet yielded gas to surface in 3 minutes and recovered 2900 feet of oil. The well was deepened to conglomerate zone at 5116-28 feet, where pipe was to be set on bottom to complete through perforations.

Montague County: The Texas Company's Hutson 1, G. W. Fletcher Survey, more than a mile east by north of the Spencer pool, was drilling sandy-lime at 3095 feet. This wildcat recovered 90 feet of oil-cut mud and when tester was used at 2616-40 feet, and a second test at 2882-91 feet returned 70 feet of oil-cut mud and 90 feet of salt water.

Hardeman County: Amerada Petroleum Corporation's Conley 1, a mile south by west of its Rice 1, Ellenburger failure at 8258 feet, plugged back from

5880 feet to make drill stem test of broken saturation at 5245-5345 feet in Canyon, topped at 5223 feet, or 45 feet high.

Archer County: Phillips Petroleum Company's Bullington 1, Browning sector of the Vogtsberger field, was drilling at 7070 feet with the Cambrian as its objective, having logged 1847 feet of Ellenburger to this level. The Texas Company's Harrison 1, southeastern Archer County wildcat, was drilling shale at 5315 feet to explore the Ellenburger before plugging back to try for production in the 3300- and 4200-foot zones.

East Texas

Freestone County Test May Be Travis Peak Discovery

The Texas Company's McKnight 1, I. H. Reed Survey, 3 miles southwest of Fairfield, is rated as a prospective Travis Peak gas-distillate discovery for Freestone County.

Entering the Travis Peak at 8000 feet, with elevation 458 feet, the wildcat logged nominal shows in coring to 8107 feet, where tester yielded the water blanket and 90 feet of mud with closed in bottom-hole pressure calculated at 4300 pounds. Broken porosity was logged in coring to 8255 feet, and drill-stem test at 8234-55 feet resulted in the 1550-foot column of water blanket being flushed from the stem, and the recovery of 450 feet of mud cut with distillate and 30 feet of 58.4-gravity distillate. The flowing bottom-hole pressure was calculated at 3725 pounds. This showing heralds a commercial producer, but the well will be deepened before landing pipe. Nearest production involves Woodbine gas in the Stewards Mill area.

Henderson County: Lone Star Producing Company's Lee 1, B. C. Walters Survey 2½ miles north of Athens, was heralded as a probable discovery in the Rodessa when a drill stem test at 8197-8208 feet yielded 270 feet of 48-gravity oil and 125 feet of rotary mud cut with brackish water. Coring was resumed to explore the Travis Peak before running pipe. This prospect is more than 200 feet high to Ohio Oil Company's recent failure 5 miles north.

Hopkins County: Humble Oil & Refining Company's Nichols 1, discovery for the Pickton area, flowed 620 barrels natural of 50.2-gravity oil, gas-oil ratio 1349/1, on ¼-inch choke from Bacon (Upper Rodessa) perforations at 7888-96 feet, having proved barren below this zone in drilling to water in Travis Peak. Sun Oil Company's Turner 1, 2 miles northeast, was drilling 6110 feet in Georgetown, topped at 5290 feet, 46 feet low.

Humble Oil & Refining Company is starting its second test between this outpost and its discovery, while Hunt Oil Company, owner of considerable acreage, is moving in for a test. The Pickton well is 25 miles from nearest line of Humble Pipe Line Company, but Gulf Refining Company has a multi-unit system only 5 miles to the east, and will likely provide the outlet as it is seeking more sweet crude for north-bound movement.

Smith County: A new depth record for East Texas and the Tri-State district is slated with the starting of Sin-

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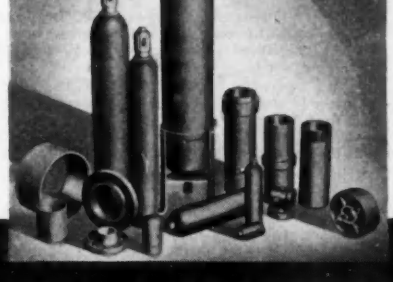

HARRISBURG STEEL CORPORATION

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clair Prairie Oil Company's D. D. Shofner 1 on 50-acre tract, Wm. Dickerson Survey A-301, west central sector of the Chapel Hill multi-pay field, with the Smackover lime as its objective. Delta Drilling Company was given contract to drill to 13,000 feet, or water in the Smackover, and will set 9⅝-inch protection string on top of the Travis Peak, which is barren, near the 8300-foot level. All important lease owners are contributing cash toward drilling this test. In the South Tyler field, Phillips Petroleum Company's Grelling 1, 3000 feet northwest of its 9900-foot Rodessa lime oil strike, was drilling at 7640 feet in Paluxy, topped at 7546 feet, being 74 feet low, while its Englander 1, 3½ miles south by west of the discovery, cemented protection string of 9⅝-inch at 6240 feet in Georgetown.

Wood County: Sinclair Prairie Oil Company's Collins 1, 8 miles northwest of Hawkins, was abandoned at 8271 feet in Paluxy, topped at 7989 feet. Bobby Manziel et al's Evans 1, J. Stark Survey 2 miles east of Quitman, was drilling at 5410 feet in Woodbine, topped at 5375 feet with elevation of 440 feet. In the Winnsboro field, Amerada Petroleum Corporation's Gamblin 1, 1400 feet north by east of the discovery, passed up both oil pays and was drilling sandy-lime at 8562 feet to explore the Travis Peak to 9000 feet before landing pipe.

Cherokee County: Humble Oil & Refining Company's Stanley 1, 3700 feet south by east of its Larissa pool discovery, entered the Pettit oolitic at 10,180 feet, or 90 feet low, and was drilling shale with streaks of lime at 10,270 feet with subnormal porosity.

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2,500 ft. 2⅜", Range I, National A.P.I. with tool joints, like new.
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Much Interest Centered On Goliad County Tests

Amerada Petroleum Corporation's Ada G. McFaddin et al, wildcat in the Hords Creek area, 12 miles west of Goliad Pedro Trevino Survey A-45, Goliad County, reperforated with 35 shots between 2 sets of squeezed perforations at 8483-8499 feet and tested with ¾-inch chokes top and bottom. There was a slight blow and a 2000-foot water cushion, but the test failed due to a stuck packer. A fishing job is making recovery. Total depth is 10,046 feet. The well has had several indications of production on drill-stem tests.

Amerada's Ada McFadden et al 2, 4760 feet west southwest of McFadden 1 on the same lease, is rigging up.

The same company's Albert Waitschies 1, E. J. Armstrong Survey, 12 miles from Goliad, is closed in, after swabbing from perforations at 5920-34 feet. Tubing pressure is 100 pounds, casing pressure 70 pounds. Total depth is 13,267 feet, but the well plugged back and drilled out to 5979 feet.

Barnsdall Oil Company will abandon Alvin Metz et al 1 at 8518 feet. Most recent perforations between 7951-56 feet tested salt water.

Nueces County: Stanolind Oil & Gas Company's Thompson 4, outpost to the East Riverside field, was shut in without gauge at 6559 feet. Official test is to be made this week.

Jim Hogg County: Sun Oil Company has located A. C. Jones 7, wildcat, on a 44,323-acre lease in the Agua Nuevo de Abajo Grant, 41 miles north of Rio Grande City, scheduled to 3000 feet. Sun's Weil Brothers 16, Santo Domingo de Abajo Grant, is drilling in a new hole below 4124 feet, after plugging back to straighten from 4700 feet to 3500 feet.

The Texas Company brought in another producer for the Armstrong field with completion of E. L. Armstrong B-19. The test flowed 128 barrels of 37.6-gravity oil per day through ¼-inch choke from 48 perforations at 3672-80 feet. Tubing pressure was 430 pounds, gas-oil ratio 2002/1. Total depth is 3688 feet.

Corrected location for Belk Investment Corporation's E. L. Armstrong 1, a wildcat 6 miles southwest of Hebbronville in Survey 107, is 330 feet from south and 2310 feet from east lines of the survey.

☆

COLONEL FRANK S. VADEN, JR., oil and gas operator of San Antonio, is in Salween Campaign combat zone with a headquarters group of Y-Force operations staff. He is a member of a Y-Force liaison team which is accompanying a unit of the Chinese Expeditionary Force to render medical and other technical asistance and to advise the Chinese commanders. He has been in the Army since 1940.

R. E. S. GEARE has been retained by Norwalk Tire & Rubber Company, Morrisville, Pennsylvania, as consulting engineer for the installation and operation of its new V-belt plant which will have a daily capacity of 15,000 belts. Geare, a graduate of Lehigh University, is a former vice president of L. H. Gilmer Company.

Texas Gulf Coast

9990-Foot Wildcat to Open New Colorado County Field

Tide Water Associated Oil Company is preparing to complete D. L. Underwood 1, Colorado County wildcat, 3 miles northwest of Sheridan, from perforations at 9517-21 feet. Previous perforations at 9500-02 and 9518-20 feet were squeezed. A 35-minute test at 9918-25 feet with 2000 pounds working pressure recovered 5 stands of oil-cut mud, 47 stands of water cushion, 4 stands of salt water, and 3 stands of mud. Packer gave way on the test. The wildcat, at total depth of 9990 feet, will open a new field for Colorado County.

Stanolind Oil & Gas Company has located a wildcat, E. A. Wiese 1, on a 480-acre lease in GH&H Survey, ¾ mile south of Magnolia's Anderson 1, discovery well of the Chesterville area. The new test will go to 9750 feet, and is the second of the field since Anderson 1 was completed in September, 1943, as a dual gas-condensate producer from the Wilcox zone, in perforations at 9500-40 feet, and in the Yegua zone from perforations at 6850-60 feet.

Matagorda County: Skelly Oil Company's Granbury-Fullerton 1, Amos Rawls League, has opened a gas-distillate area and is shut in waiting on official gauge. On a 4-hour test, using 3/16-inch choke, the well flowed 2,137,000 cubic feet of gas and 42.8 barrels of water-white 51.3-gravity distillate from 12 perforations at 8730-34 feet. Gas-oil ratio was 80,309/1. Total depth of well is 10,010 feet, though it was plugged back to 8996 feet for completion.

Tyler County: American Republics Corporation and Houston Oil Company of Texas abandoned Rice 1, wildcat in BBB&C Survey 9, 6 miles southwest of Spurger. First tests of the Wilcox were barren and operators plugged back to test the 5000-foot Cockfield formation. It was abandoned in final perforations at 5045-48 feet.

Jefferson County: Humble Oil & Refining Company's Jefferson Land Company C-1, Shelby Corzine Survey A-14, northwest edge of Lovell Lake field, is classified as a new field discovery by the company, being 3600 feet north of nearest Lovell Lake production. The producer flowed from 22 perforations at 7176-80 feet while field wells produce from a sand at the 7700-foot level. Jefferson C-1 flowed a potential of 86.5 barrels of 28.9-gravity on ⅛-inch choke. It was originally drilled as a deep test and went to 9963 feet, but plugged back to 7211 feet for completion after setting 9⅝-inch pipe at 9278 feet.

Washington County: Magnolia Petroleum Company is preparing to abandon Hernam Lauter 1, deep test on the flank

Harrell Soon to Assume Bammel Well Ownership

After 18 months of unsuccessful attempts to get the wild well in the Bammel field, Harris County, under control, F. M. Corzelius is ready to pay someone to take it off his hands. According to reports from Austin, a deal is being consummated whereby Corzelius is to transfer ownership of his Meineke 1, the wild well, to H. M. Harrell, the only other operator in the field, along with $150,000 in cash. In consideration of the lease and the cash, Harrell will give Corzelius releases from 90 percent of the claims for damages amounting to more than $3,000,000, held by people who believe the well has hurt their properties since it went out of control.

Upon transfer of ownership, the Texas Railroad Commission will issue an order directing Harrell to kill the well, and he will attempt to do so through a directional relief well, using the money obtained from Corzelius. Members of the Railroad Commission have been active in negotiating this arrangement, and will move to have a receivership dismissed which will enable Corzelius to transfer ownership.

BE SURE TO CHECK . . . .
Trading Post Section
ON PAGE 85 OF THIS ISSUE
Because of the scarcity of certain types of new equipment and the fact that some operators may have a surplus of some items and a serious shortage of others, this **Used Equipment Forum** is performing a valuable service to operators in locating needed used materials or disposing of surpluses that may be needed by others.

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of the Clay Creek field, which had promised to complete as a small pumper from a new Wilcox pay at 4606-11 feet. Total depth of well was 8022 feet.

Harris County: Glenn McCarthy has applied for drilling permit for a wildcat test, Edward E. Lemm 1, Spring area, William Lemm Survey A-519, 1½ miles south and west of Eltex, Ltd.'s discovery just south of Spring. This test will reveal significant data on Spring's possibilities as a producing area, which so far has only one well in the field. Glenn McCarthy's test, a mile west of the produced was a dry hole, as was Eltex's northeast offset to the discovery, which is flowing from Cockfield sand at the 6245-foot level.

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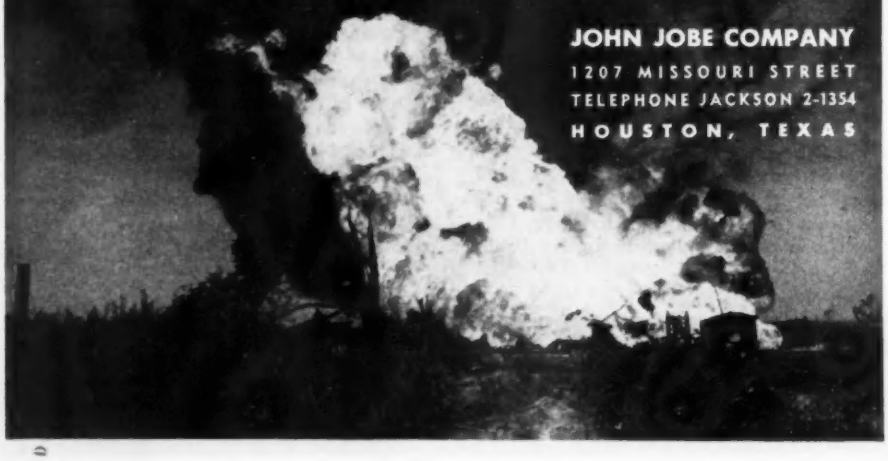

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South Louisiana

Promising Avery Island Well Still Testing New Sand

Humble Oil & Refining Company's Petit Anse B-2, 23-13s-5e, Avery Island, which promises to produce from a new sand at 9500 feet, is still testing. Gauge based on a 3½-hour test indicated a flow of 684 barrels per day of 33.6-gravity oil through an 11/64-inch choke from perforations opposite 9515-28 feet. Tubing pressure was 1600 pounds, casing sealed. Perforations have been squeezed and the well reperforated at 8954-64 feet for another test.

Humble has staked location for Petit Anse Company B-3 in 23-13s-5e, which will be drilled with company rig to 10,000 feet when the Petit Anse B-2 is completed.

Plaquemines Parish: Gulf Refining Company has completed State-West Bay 10 in 35-22s-30e, West Bay field, from perforations at 9252-58 feet. The well is flowing 365 barrels per day on 9/64-inch choke of 32-1-gravity oil. Total depth is 11,200 feet. The well had been brought in several weeks ago in perforations at 10,888-92 fet, a new sand for the field, and flowed 390 barrels of 30-gravity oil, but was reworked and completed.

Iberville Parish: Humble Oil & Refining Company's C. G. Robinson, J, Laurel Ridge area, 91-13s-10e, which tested at 10,658-660 feet, squeezed perforations and plugged back to 10,628 feet, where it is waiting on cement.

Lafourche Parish: Humble completed I. R. Price 1, 26-16s-22e, Delta Farms, in perforations from 9413-24 feet. The well was flowing 5.5 barrels of 36.5-gravity oil per hour through 5/32-inch choke. Total depth is 9490 feet and the well is shut in. This is the first Humble completion in the area in several months.

Cameron Parish: Stanolind Oil & Gas Company's Joseph Bishop 1, wildcat in 5-15s-8w, Creole area, has been abandoned at 8930 feet, where it was fishing, following a flow of salt water from bottom of hole.

St. Landry Parish: Claude Morgan has staked location for Frank Dimmick 1 as a wildcat in 173-7s-4e, proposed depth being 10,400 feet.

Jefferson County: The California Company's E. P. Brady et al 1, 2-16s-23e, deep wildcat test, is drilling below 10,580 feet in shale.

Kansas Ranks Fifth

Kansas ranked fifth in the nation in the production of crude oil and natural gas last year, according to a compilation by the Bureau of Mines, Economics and Statistics branch, which showed that Kansas produced crude oil valued at $127,400,000 in 1943, this figure being surpassed only by the 1920 level when the state's crude oil production was valued at $133,469,000, although the volume of oil produced in 1920 was less than that of 1943.

Fuels, including crude oil, natural gas, liquefied petroleum gases and coal produced in Kansas were valued at $189,099,000 with the production of natural gas establishing a record with a value of $46,550,000. Other fuels and their values were coal, $11,433,000; natural gasoline, $3,284,000, and liquefied petroleum gases, $432,000.

North Louisiana

Holly Ridge Field Has Gas-Distillate Producer

Magnolia Petroleum Company completed R. D. Shelley B-2, 30-11n-10e, as the first gas-distillate producer in the Holly Ridge field, Tensas Parish. Distillate tested 58 gravity and flowed at the rate of 173 barrels, acompanied by 2,700,000 feet of gas daily from 48 perforations at 8324-39 feet and 96 shots from 8355-96 feet in the Massive sand. Tubing with packer was run to 8345 feet; total depth of well is 8400 feet; a string of 7-inch casing was cemented at 8399 feet before perforating. Magnolia is requesting permission to dual complete the well, and is taking bottom-hole pressure tests.

Stanolind Oil & Gas Company's R. D. Shelley 4, 30-11n-10e, another producer in the field, is flowing into pits but with no accurate gauge. One hundred perforations were made opposite the Massive sand section from 8351-76 feet. Total depth is 8426 feet, with string of 5½-inch casing set at 8417 feet.

Lincoln Parish: The California Company's Jessie Mae Norris 1, C NW NE 15-18n-1w, has been officially completed and opens the Tremont field. Department of Conservation gauge indicated the well flowing 8.11 barrels of 57.2-gravity distillate in 2 hours through ⅛-inch choke on tubing, accompanied by 2,235,000 feet of gas per day. Tubing pressure registered 4085 pounds; gas-oil ratio was 23,041/1. Production is from 119 perforations opposite sand at 9060-80 feet.

Big West Drilling Company's N. B. Gill Estate 1, C NW SE 35-20n-2w, wildcat in the northwestern part of the county, cored sand showing salt water from 5234-54 feet and 5405-25 feet, but has had no shows indicating commercial production.

Red River Parish: The Texas Company's Semp Russ 1, 16-12n-10w, has run electrical survey after cementing 7-inch casing at 7173 feet. Although survey has not yet been correlated, plans are to perforate in the Travis Peak horizon which carried shows of gas and possibly oil. Later perforations may be made in the Rodessa section and a sand at 2700 feet. The Pettit, from 6333-48 feet, showed good porosity capable of producing gas on a core.

A deep wildcat test may be made in the southeastern sector of the parish in Section 8-12s-8w. The area seems due for more prospecting.

Bossier Parish: Barnsdall Oil Company-Sohio Petroleum Company have been unable to make further tests of J. T. Hanks 1, NW SE 7-20n-12w, gas-distillate discovery, Benton field, because tankage was filled. Latest gauge was 164 barrels of 61.6-gravity distillate in 24 hours flowing through ¼-inch choke on tubing from 234 perforations opposite the Cotton Valley "D" sand at 8001-40 feet. New tests probably will not be staked until field rules have been determined.

Caldwell Parish: Shell Oil Company is reconditioning hole between 8300 and 8400 feet in Louisiana Central Lumber Company 1, NW 31-15n-3e, wildcat which blew out of control, indicating a new gas or gas-distillate field, after a fishing job at 10,141 feet.

Grant Parish: Calapor Manufacturing Company went to 4538 feet in shale in Edenborn 1, 20-7n-3w, but failed to get an indication of commercial production and has ordered the well abandoned.

Jackson Parish: Shell Oil Company is drilling below 7943 feet in shale in Tremont Lumber Company 1, C NW SE 22-15n-1w, Chatham area. The well is reported to have logged shows of gas and distillate in the Travis Peak horizon.

☆

J. G. ATKINS, Gulf Coast district superintendent for the Stanolind Pipe Line Company with headquarters at Tomball, has been transferred to Mexia, Texas, and is succeeded by John Jaco, foreman for the Electra-K-M-A district, which is being consolidated with the Bowie district under Superintendent I. H. McVickers.

Arkansas

Strong Discovery Awaiting Equipment for New Test

Root Petroleum Company is awaiting installation of pumping equipment before testing further in Union Saw Mill 1, C NW NW 27-18s-12w, new discovery in the Strong area of southeastern Union County. After completing a successful squeeze job on the Smackover the well was perforated with 24 shots from 6319-29 feet opposite porous lime and swabbed at the rate of 3½ barrels of pipe line oil per hour. An estimate of 75 to 100 barrels of oil is likely, which may prevent development of the area by offsetting.

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Total depth is 6381 feet with 5½-inch casing cemented at 6363 feet.

Kerlyn Oil Company recovered 96 feet of slightly gas-cut mud and 60 feet of salt water on a 30-minute drill-stem test of Crossett Lumber Company 1, C SW SW NW 9-19s-10w. Test was made of the Cotton Valley series from 4260-65 feet, packer having been set at 4255 feet. The well is drilling to the Smackover lime but any sands showing in the Cotton Valley horizon are likely to be tested.

Kerlyn has staked location for Church (Union Saw Mill) 1, SW SW SE 22-19s-11w, 4 miles south of Lapile townsite, southeastern part of the county. It is to be a proposed Smackover lime test.

McAlester Fuel Company recorded a flow of 60 barrels of distillate and 2,500,000 cubic feet of gas in 24 hours through 13/64-inch choke on tubing to complete Wilson-McRae 1, NW SE SW 28-16s-18w, second producer in the Salem Church field. No formation water was showing. Root Petroleum Company is building derrick and preparing to move in rig for Manning 1, NW SE SE 29-16s-18w, the third Smackover lime test in the field, which was brought in this year by The Carter Oil Company.

Root was also rigging rotary at McRae 1, C SW SE 16-16s-18w, another Smackover lime wildcat test 2 miles north of production.

Miller County: Arkla Oil Company was preparing to perforate the Gloyd section, believed a possibility for gas-distillate production in R. T. Dodd, C SW NW 11-19s-28w, wildcat in the Bright Star area. String of 5½-inch casing has been set at 6695 feet with total depth at 6810 feet. Gloyd was topped at 6493 feet.

Atlantic Refining Company is drilling below 4265 feet in shale in Montana Realty 1, 17-17s-28w, wildcat seismically high in the western part of the county. No shows have been reported.

Pope County: Stanolind Oil & Gas Company is drilling with cable tools below 4176 feet after cleaning up another fishing job on G. B. Maxwell 1, C SE SE 18-8s-18w, deep wildcat.

Johnson County: Arkansas-Louisiana Gas Company is also drilling slowly with cable tools below 6117 feet in sandy lime at S. M. Hudson 1, C NE 15-20n-24w, Arbuckle lime test in the Clarksville field. Operators spent time reaming to straighten crooked hole at 6112 feet. So far no shows of oil or gas have been reported in the deeper horizons.

Columbia County: G. H. Vaughn is drilling below 5120 feet without shows in Jackson 1, C SE SW 8-16s-21w, wildcat near Walde townsite, scheduled to the Smackover.

Midstates Oil Corporation is rigging up on George Reed 1, 34-19s-20w, ¼ mile test north of production in the Haynesville field, which is considered to have excellent chance for production. The company has just completed a good producer there in Ike Reed 1, 34-19s-20w, which gauged 134 barrels of oil per day through ⅛-inch choke on tubing from 90 perforations in the Upper Pettit at 5610-26 feet. Thus far the field has more than 400 feet of closure and there is no evidence of water.

Ashley County: Union Producing Company has abandoned Crossett Lumber Company E-1, 12-19s-7w, 5 miles east of Hamburg, and the deepest test ever drilled in this sector of the state, at 11,136 feet in hard sand and igneous material. Electrical survey failed to indicate possibility of production.

Southeastern

Lamar County Discovery Has High Oil-Gas Ratio on Test

Gulf Refining Company's C. V. Cooper 1, C NE NW 7-1n-16w, Baxterville area, new Lamar County, Mississippi, discovery, recorded a flow of 21.6 barrels of 16.4-gravity oil per hour during a 7-hour test through tubing. The well has a surprisingly high gas-oil ratio of 3140/1. Volume of gas is 67,800 cubic feet per hour. Production was cut by 6 percent fresh water and 5 percent basic sediment and sand. Perforations are from 8690-8714 feet in the upper portion of the Massive sand. Crews are scraping previous perforations and additional shots will be made from 8734-44 feet, lower in the Massive section, in an attempt to increase oil production and lower the gas-oil ratio. Electrical survey indicated top of the broken Massive sand at 8689 feet, with solid sand logged from 8725-8839 feet. The discovery was drilled to 9080 feet in gray sand and 7-inch casing was cemented at 8950 feet.

Shell Oil Company's Hibernia Bank & Trust Company 1, 14-2n-16w, wildcat on the flank of the Tatum salt dome, is drilling in shale below 8520 feet without shows of oil.

Sinclair Wyoming Oil Company ran an electrical survey at 7492 feet in Newman Lumber Company 3, C NE SW 5-5n-16w, and set intermediate string of 9⅝-inch casing at 3364 feet. The wildcat is scheduled to 10,000 feet.

Further exploration in the southwestern sector of Lamar County and the state is handicapped by lack of available rigs, most of which are being used at Heidelberg and Eucutta. More may be available after the first of the year, especially rigs equipped to go to 10,000 feet and below, since this district is becoming active in proven field and wildcatting.

Pearl River County: Hassie Hunt, Trustee, is moving in derrick for R. Batson 1, C NE SW 10-1s-14w, scheduled 11,000-foot wildcat, 18 miles southeast of the new Gulf discovery in Lamar County.

Sinclair Wyoming Oil Company is drilling below 3292 feet in shale at R. Batson 1, 20-1s-15w, another wildcat 9 miles southwest of the new Hunt location and 12 miles southeast of Gulf's strike.

Adams County: The California Company completed National Gasoline Company of Louisiana 9, 66-7n-1w, for one of the best producers in the Cranfield pool. The well was flowing 483 barrels daily through 3/16-inch choke on tubing. Tubing was set with packer before final test was made. Production is from the Massive sand through 300 perforations opposite pay at 10,354-10,404 feet. Depth is 10,473 feet with casing cemented on bottom. The company has 3 wells drilling in the field, all expected to complete within 3 weeks.

The Pure Oil Company has bottomed J. M. McDowell 2, 12-6n-3w, in shale and is running an electrical survey. This deep wildcat is in the western section of the county. Humble Oil & Refining Company is drilling at 10,871 feet in hard shale in Mrs. Ida Stowers A-1, 9-8n-2w, another deep test, but is withholding geological information until completion.

Jefferson Davis County: Gulf Refining Company's D. L. Mullins 1, C NW NE 34-9n-19w, 2½ miles southwest of the Gwinville field discovery, is drilling below 9106 feet in hard sandy shale, probably in Marine Tuscaloosa, and is looking for top of Massive around 9300 feet. The Eutaw section has revealed a showing of gas-distillate production in a test made at 8119-40 feet.

Superior Oil Company's Willie Durr 1, C NW NE SW 19-9n-18w, 1 mile east of the Gwinville strike, is drilling below 7266 feet, but has reported no show of oil.

Lawrence County: Humble Oil & Refining Company is moving in rig for S. M. Nelson 1, 8-6n-20w, deep wildcat test on a Gulf farmout. It is ¾ mile south and west of Gulf's Hickman 1, drilled to 9276 feet before being junked and abandoned.

Jasper County: Gulf spudded in Edwards-Bailey Unit 1, C NW SE 27-10n-13w, wildcat 12 miles west and 4 miles south of Heidelberg production on a very favorable prospect.

F. R. Jackson et al have made location for E. R. Huddleston 1, C NW SE 9-10n-10w, 1 mile south and ½ mile west of Kingwood Oil Company's Hill 1, recent extension to Heidelberg.

Alabama

W. O. Woodward, Trustee's Mary Green 2, 31-11n-4w, near Green 1, Choctaw County, has encountered a fishing job. The well has given indication of making a pumper from sand between 2816 and 3500 feet, plugged back depth. No gauge has been reported.

Hunt Oil Company is rigging up rotary tools at M. W. Smith Lumber Company 1, C NE SW 11-10n-4w, wildcat test 1½ miles southwest of production in the Gilbertown field, and is due to spud.

J. T. Parks' Hobson 1, C SW NE 9-8n-2w, Washington County, was at 1075 feet and shut down for repairs. It is scheduled to 5500 feet.

Roland, Hamilton & Jarvis are expected to abandon J. W. Rudder 1, C SW SW 7-11n-3w, another Choctaw County wildcat. The Eutaw was topped at 3260 feet, and the well logged sand with possible salt water in drilling to 3742 feet.

The Texas Company has reached 8303 feet in N. S. Stallworth and Company 1, 10-3n-3w, Washington County, and was shut down, awaiting drill pipe.

Georgia

The California Company's Brunswick Peninsula 1, Land Lot 7, is drilling below 2375 feet in shale, with 10-inch casing cemented at 907 feet.

Florida

Two of Florida's wells are drilling deep enough to be watched with interest. In Gulf County, The Pure Oil Company's C. C. Hopkins 1, 21-6s-9e, is below 7409 feet in sandy shale. In Dade County, Humble Oil & Refining Company's State 1, C NE NW 30-55s-36e, is below 8096 feet in anhydrite, after a temporary shut-down at 8012 feet to repair motors. Two other wells in this county, both operated by W. G. Blanchard, are shut down.

In the Sunniland area, Collier County, Humble is drilling below 850 feet in sand and shale in Gulf Coast Realties 4, 20-48s-30e, Stanolind Oil & Gas Company was drilling at 6175 feet in St. Joe Paper Company A-1, 50 feet NW C NE NE 15-2s-2e.

Michigan

Wildcat Activity Drops Below Tempo of Summer

Operations continue to run between 175 to 200 tests in Michigan but wildcat interest is considerably lower than during the summer. Only one field drilling campaign of importance is in progress, with Sohio Petroleum Company showing 10 operations and 6 locations in the Coldwater field of Isabella County.

Bay County: Shell Petroleum Company's Kureja 1, SW SE SW 35-17n-4e, north offset to the Fraser discovery well, is drilling deeper but prospects for Dundee production have faded with that section already penetrated. The company plans to carry the test to 3200 feet or more to the Sylvania. The discovery produced in the Dundee lime at 2900 feet.

Wexford County: Idle since July 8 because of dry-hole money differences, Teater and Americrude's Wexford Road 1, NE SE NW 10-21n-9w, Wexford County, again is active. The important wildcat was shut down at 3842 feet after logging Dundee objective at 3836 feet. Drilled to 3850 feet it had not showed a pay.

State Leases: The Lands Division, Michigan Conservation Department, leased 20,953 acres of wildcat land for $14,791 November 3 to conclude its 1944 leasing campaign. During the year the state leased 216,381 acres for a bonus of $179,557. A new record was established when Rowmor and Teater paid $54,000 for a 40-acre lease in Arenac County.

☆

A. W. McCOY III, formerly with The Carter Oil Company at Billings, Montana, and A. B. McCollum, geophysical supervisor for Superior Oil Company of California at Oklahoma City, have joined the geological and geophysical departments of Deep Rock Oil Corporation, Tulsa.

Illinois Basin

Extension in South Noble Field Has Promising Test

Walter Duncan's Morris 1, SW SE SE 13-3n-8e, Richland County, is listed as a north extension of the South Noble field. In a drill-stem test the well flowed oil in 46 minutes and casing was set to McClosky lime at 2990 feet.

Edwards County: Six miles south of Albion and ½ mile south of production in the Albion pool, Dee Brothers and Milt Lobree's Hodgson 1, NE SW NE 11-3s-10e, has set casing for test of the Biehl sand at 2020-31 feet. During a drill-stem test, the well showed 950 feet of gas, 810 feet of clean oil and 60 feet of drilling fluid in one hour.

Kingwood Oil Company's Iles 1, NW NW SE 4-2w-14w, wildcat test, has been completed in the McClosky lime at 3023-30 feet and 3115-17 feet for 12 barrels of oil per day on pump.

Effingham County: Schulman Brothers' Vieth 1, NE NW NW 34-6n-7e, wildcat, is making 100 barrels a day on swab test of Cypress sand at 2528-35 feet.

Jackson County: John Pugh's Jackson County Coal Company 1, NE NE SW 22-7s-1w, has been abandoned at 2200 feet. The well was in wildcat territory.

Clinton County: The Texas Company was waiting on cement at Althoff 1, SE SW SW 23-1n-3w, wildcat, to test Cypress sand saturation encountered at 953 feet. Total depth was 2529 feet.

Bond County: The Texas Company's Miller 1, NW NW NW 22-6n-2w, is a wildcat location.

Douglas County: Ohio Oil Company's Shaw 1, SW SW SW 36-16n-8e, rank wildcat in an area held promising by the Illinois State Geological Survey, is drilling below 3900 feet with standard tools.

Hamilton County: National Associated Petroleum Company's Gowdy 1, NW SE NE 34-4s-7e, is cleaning out after a 10-quart shot in the Aux Vases sand at 3308 feet. Prior to the shot, the well swabbed 239 barrels of oil in 24 hours.

Kentucky

Only wildcat discovery in Kentucky in October was Bartmes and Pruitt's Willson 1, 17-N-23, Webster County. It had initial production of 318 barrels in 24 hours from Tar Springs sand at 1908-20 feet, latter figure total depth. It was listed as a discovery well for the Wannamaker pool.

Indiana

Indiana's lone wildcat discovery in October was Rodgers Cartage Company's Deakin-Lynch 1, SE SW SW 25-7s-15w, Posey County. The well initially pumped 55 barrels of oil in 24 hours from McClosky lime at 2795-2805 feet. It is a discovery of the West Hovey pool.

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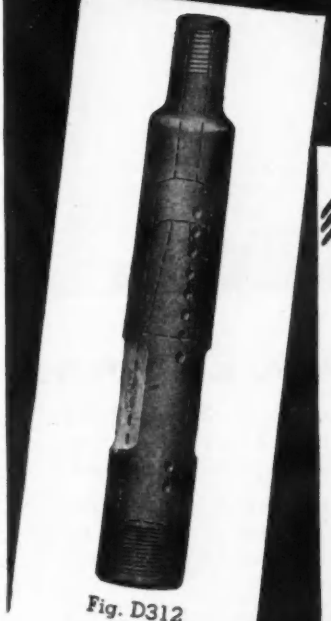

Fig. D312

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California

Kern County's Buena Vista Field Has Two Blowouts

Two blowouts occurred in the Buena Vista Hills field, Kern County, and one well was still out of control late in the week. Standard Oil Company's 325-26B, 26-31-23, blew out while testing casing and was blowing gas only at an estimated flow of 45 million cubic feet. North American Oil Cons. 81, 2-32-23, blew out of control and was flowing oil at the rate of 9000 barrels per day. Most of the oil was saved by blocking off the mouth of the ravine in which the well was being drilled.

Kern County: Standard Oil Company's world's deepest well, K.C.L. 20-13 5, 31-25, was drilling again at 15,845 feet after recovering stuck drill pipe. The well is more than 3 miles deep.

Bandini Petroleum Company-Bacon 1, 27-28-20, deep test of the Bacon Hills area, drilled to 10,499 feet and has 7-inch casing standing cemented at 10,499 feet. Drilling equipment is being moved out and a heavy outfit brought in.

Harry H. Magee, Operator-Amalgamated-Happold 2 in 15-25-24, Trico area, tested wet in the Vedder zone and will be deepened to the Eocene. Present depth is 10,390 feet.

Kings County: Southern California Petroleum Corporation - Socal - Bergan 88-32, 32-19-20, near Stratford, is prospecting at 9250 feet. No oil showings have been logged in the Tembolar. This is Kings County's only active wildcat.

Los Angeles County: Barnsdall Oil Company's R.S.F. 44, deep test of the Newhall-Potrero field, is coring at 8357 feet in shale and oil sand. The corings cored are below the known producing horizons.

Ventura County: A. Oberholtz, Operator is building roads preparatory to deepening the abandoned Tide Water Associated Oil Company's Snowball 1, located 47 feet north and 68 feet east from center of NW¼ 19-4n-24w. The well was abandoned in June, 1934, at 2082 feet.

Pacific Section Petroleum Geologists Name Officers

Glenn H. Bowes, Continental Oil Company, Los Angeles, was named president of the Pacific Section, American Association of Petroleum Geologists, at the annual meeting in Los Angeles last week.

Robert T. White, Barnsdall Oil Company, Los Angeles, was named vice president; and Vincent W. Vandiver, Seaboard Oil Corporation, Los Angeles, was chosen secretary-treasurer.

Geology of California, Oregon and Colombia and international aspects of the Middle Eastern oil reserves were discussed.

Receive Safety Award

The "Distinguished Service to Safety" award of the National Safety Council, was made recently to Standard Oil Company of California, in Los Angeles.

Three units received the award, including the natural gasoline department, the marine department's inland fleet, and the drilling division. A certificate of safety and an "S" pennant go with each award.

WESTERN CANADA

Extensions May Increase Turner Valley Production

Though production has been declining for two years (current yield is about 12 percent under that of a year ago), Alberta's only major oil field to date—Turner Valley—may not have passed its productive peak. The decline has resulted from slowdown of drilling in the remaining undeveloped section of the proven field. New developments, however, indicate operators' belief that limits of the field have yet to be defined.

Home-Millarville 18, outpost in the North Extension of the field, has developed a heavy oil and gas flow with formation pressure around 3000 pounds in a limestone uplift immediately west of the main Turner Valley structure. On brief flush runs after initial acid wash, the well gave more than 1000 barrels daily, with a gas-oil ratio of about 10,000, probably indicating a gas cap on the deep uplift west of the water-bearing base of the main structure.

The Home 18, in lsd 7, 18-21-3w5th, drilled the West Uplift Lime from 8362 to 8640 feet and the Main Uplift lime from 8650 to 9084 feet, completion depth. The well is backed 75 percent by Home Oil Company and 25 percent by Anglo Canadian Oil.

In the southeast end of Turner Valley, a group of leading operators have joined to determine what lies below the fault now limiting this end of the field

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to the east. Hopeful that oil and gas bearing Madison lime will be encountered below the Fault—as occurred in the northeast end of the field—the companies are resuming drilling at the Okalta Oils 7 well, in lsd 3 16-18-2w5th. This well reached the Madison at 6965 feet and halted at 7425 feet in 1939, and was produced until July of this year. The site is 660 feet north and 200 feet west of National 2, which reached the lime in 1938 at 7084 feet and faulted into Blairmore at 7660 feet. The Okalta well should enter the fault soon, and an underlying body of Madison between 1000 and 2000 feet.

Success at Okalta 7 would again throw open for development an area written off when National 2 hit the fault 6 years ago. Backing the test are Royalite Oil Company, Home Oil, Anglo Canadian Oil, Calgary & Edmonton Corporation and Okalta Oils, Ltd.

Continuing to probe possibilites of the East Side in North Turner Valley, Foothills Oil & Gas Company (Standard of New Jersey) has started its Foothills 22 in lsd 2 26-20-3w5th, in an undeveloped part of the field left idle since 1929. The new well is 2300 feet east of the Foothills 1, which topped the lime in 1928 at 5353 feet, and completed at 5914 feet as a substantial gas and oil producer. It is 1780 feet from Foothills 4, abandoned in 1929 at 4559 feet after drilling Benton to that depth. The new well is a mile east and ¾ mile south of Foothills 13, which missed the Main Uplift Lime in 1943, drilled on to reach the East Side Lime at 10,048 feet, and was abandoned at 10,230 feet with water and some oil showing in the Upper Porous zone.

A price of $1.25 per barrel at the railway siding of Denhart has been paid by North Star Oil, Ltd., operator of a refinery at Winnipeg, for the 25-26 gravity crude produced from the Bow Island sand at the Princess-Steveville Syndicate 1 well.

The 34.5 gravity crude from California-Standard's Princess 8 well is being delivered to the British American Oil refinery at Moose Jaw, but price for this crude has not yet been established. It is likely to be between $1.50 and $1.75 per barrel.

Research in Synthetic Oil Outlined by Mines Bureau

The Bureau of Mines last week published Technical Paper 666, summarizing the research of the past eight years in the production of oil and gasoline from coal and lignite bases for the five-year program now under way to demonstrate the commercial possibilities of synthetic oil production.

The paper explains in detail the experiments in hydrogenation and liquefaction conducted at the bureau's Pittsburgh laboratory, and the apparatus and experimental procedure employed as well as chemical-process information obtained in a large number of batch-hydrogenation tests in small steel autoclaves.

Copies of the report may be obtained from the Superintendent of Documents, government printing office, at 15 cents each.

☆

TROY STALLS, West Texas representative of the Stanolind Oil Purchasing Company with headquarters at Midland, has been transferred to Wichita, Kansas, where he will join the land department of the Stanolind Oil & Gas Company.

U. S. Exploratory Completions

ARKANSAS WILDCATS

Ashley County—Failure: Union Prod. Co.'s Crossett Lbr. Co. E-1, 12-19s-7w, elev 137 ft, abnd 11,136 ft, hard sd and igneous material.

Johnson County—Failure: Arkla-Okla Gas Co.'s J. C. Tipton 1, 29-10n-24w, abnd 4050 ft.

CALIFORNIA WILDCATS

Kern County—Failures: Superior Oil Co.'s Moor 1, nw sw 15-29-21, Cymric area, abnd 3360 ft.

Aja Oil Co.'s S. P. 9, ne nw 3-27-28, Mt. Poso area, Vedder 1436 ft, abnd 1488 ft.

Rothschild-Bender's Sheep Springs 3, se se 17-29-21, Sheep Springs area, Carnerous 3688 ft, tested wet, abnd 3730 ft.

ILLINOIS WILDCATS

Clay County—Failure: Roy R. Powers' Freeman Hrs. 1, sw ne se 23-2n-8e, abnd 3155 ft.

Clinton County—Failure: R. L. Rea's Jansen 1, sw ne ne 32-2n-2w, abnd 1261 ft.

Gallatin County—Failure: Continental et al's Maloney 1, ne ne nw 35-8s-9e, abnd 2972 ft.

Hamilton County—Failure: Reward Oil's Walker 1, se nw nw 13-6s-7e, abnd 3514 ft.

Madison County—Failure: Fox & Fox's Cassen 1, ne nw ne 14-5n-7w, abnd 2366 ft.

Shelby County—Failure: H. Luttrell et al's McAndrew 1, sw ne 15-10n-6e, abnd 2319 ft.

St. Clair County — Failure: C. W. Young's McCurdy 5, sw nw sw 29-3s-6w, abnd 545 ft.

Wabash County—Failure: A. H. Anderson et al's Couch 1, sw nw se 2-1n-13w, abnd 2691 ft.

INDIANA WILDCATS

Posey County—Failure: H. E. Ledbetter et al's Helm 1, sw sw ne 15-6s-14w, abnd 3000 ft.

Sullivan County—Failure: Texas Co.'s Phegley 1, se ne nw 14-6n-10w, abnd 2846 ft.

Wabash County — Failure: Texas Co.'s Peebles 1, se sw sw 35-27n-6e, abnd 986 ft.

Warrick County — Failure: Eureka Oil's Helms 1, sw sw nw 23-6s-8w, abnd 1886 ft.

KANSAS WILDCATS

Barton County—Failure: Vicker's Bortz 1, se ne nw 32-17s-11w, Lans 3045 ft, Arb 3351 ft, abnd 3401 ft.

Butler County—Failures: Glen Smith et al's Evans 1, sw se se 3-23s-8e, Miss 2685 feet, abnd 2760 ft.

E. S. Adkins Taylor 1, nw nw ne 17-27s-4e, Miss 2643 ft, Arb 2846 ft, abnd 2882 ft.

Ellis County—Failure: Texas Co.'s Elmore 1, se se sw 35-15s-20w, abnd 3843 ft.

Lane County — Failure: Shallow Water's Erickson 1, nwc 19-19s-29w, Miss 4552 ft, abnd 4656 ft.

Leavenworth County—Failure: Mosbacker's Sloan 1, swc ne 16-9s-22e, Miss 1290 ft, abnd 1468 ft.

Ness County—Failure: Texas Co.'s Goebel 1, ne ne se, Arb 2969 ft, abnd 5028 ft.

Rooks County—Failure: Globe et al's Federal Farm Mortgage 1, nwc ne, Arb 3596 ft, abnd 3649 ft.

Saline County—Failures: Cummings' Carey 1, se sw sw 16-17s-2w, Miss 3070 ft, abnd 3108 ft.

Coralena Oil's Jacobson 1, nw se nw 29-17s-2w, Lans 2441 ft, abnd 2445 ft.

KENTUCKY WILDCAT

Webster County—Oil Discovery: Ross, Bartmes et al's Wilson 1, 17-N-23, pump 318 bbls oil, Tar Springs 1908-20 ft, td 1920 ft.

SOUTH LOUISIANA WILDCATS

Calcasieu Parish—Oil Discovery: Continental's Glen Greathouse et al 1, 330 n&e of sec 9-11s-8w, South Lake Charles area, 5 mi e East Moss Lake field, perf 10,018-26 ft, flow 130 bbls 52.9-gr oil, 1,639,000 gas, 11/64-in, shut in, td 11,019 ft.

Cameron Parish—Failure: Stanolind's Joseph Bishop 1, 660 s&e of nwc 5-15s-8w, Creole area, abnd 9830 ft.

MISSISSIPPI WILDCATS

Copiah County—Failure: Joe B. White-Big West Dr. Co.'s Magnolia Textiles 1, c se se 8-9n-7e, elev 380 ft, Sparta 2358 ft, Chalk 7896 ft, Austin 8563 ft, Massive 10,115 ft, Lower Cret 10,212 ft, abnd 10,226 ft.

Hinds County—Failure: J. V. Canterbury's J. R. Ball 1, c nw se 7-5n-1w, abnd 6150 ft.

Holmes County—Failure: Fisher Dr. Co.'s W. M. Thompson 1, 24-14n-2w, elev 118 ft, abnd 6320 ft.

Jones County—Failure: Gulf's Graves-Lindsey-McLauren 1, c nw se 20-9n-10w, elev 230 ft, Wilcox 1630 ft, Midway 4104 ft, Eutaw 5410 ft, Tuscaloosa 5960 ft, Marine Tuscaloosa 6690 ft, Massive 7102 ft, Lower Cret 7267 ft, abnd 7456 ft.

NEW MEXICO WILDCATS

Donna Anna County—Failure: Al Parker et al's State 1, c nw se 15-23s-5e, oil trace 3002 ft, abnd gray shale 4260 ft.

Eddy County—Failure: Stanolind's State 1-N, c se nw 2-20s-31e, elev 3476 ft, anhydrite 969 ft, salt 1560-1994 ft, oil trace 2230-40 ft, abnd 2488 ft.

OKLAHOMA WILDCATS

Ateka County—Failure: Burns Oil Co.'s Zweigle 1, nw sw sw 16-3s-10e, McLish 3865 ft, abnd 4326 ft.

Garfield County — Failure: E. S. Adkins' School 1, nw ne nw 36-21n-4w, Neva 1904 ft, Foraker 2084 ft, abnd 2310 ft.

McClain County — Oil Discovery: Carter's Johnson 1, c sw se 30-8n-2w, flow 322 bbls oil, 3½% wtr, perf 8190-8222 2nd Wx, td 8222 ft.

Noble County — Failure: Summitt Drlg.'s Barto 1, se sw 10-20n-1w, Wdf 5117 ft, Vi 5312 ft, abnd 5313 ft.

Okfuskee County—Failure: Manahan Oil's Kennedy 1, se se 19-11n-8e, Booch 3432 ft, Cr 3676 ft, abnd 3725 ft.

Pawnee County—Failure: Kerlyn Oil's Barrier 1-A, nw ne nw 22-23n-5e, Wdf 3501 ft, Dol 3505 ft, Wx 3520 ft, abnd 3674 ft.

WEST TEXAS WILDCATS

Concho County—Failure: Anzac Oil Corp.'s White 1, 440 ft out swc J. H. Huey sur No. 4, elev 1938 ft, Ellenburger 1760 ft, abnd 1808 ft.

Pecos County—Failure: Standard of Texas' Bonebrake 1, c se nw H&GN Ry. 49, blk 8, elev 2566 ft, anhydrite 1823 ft, Rustler 1914 ft, lime 2865 ft, abnd flow sul wtr 2897 ft.

SOUTH CENTRAL TEXAS WILDCATS

Bastrop County—Failures: Marts & Beaven-O. W. Killam's Mrs. Addie Mae Powell 1, 1400 sw Colorado River on sw projection nwl Hodges 45-ac tr, 3800 e of wl of 3600-ac of 1110-ac tr, J. M. Bangs sur, Eagleford 3196 ft, Buda 3219 ft, Del Rio 3279 ft, Georgetown 3350 ft, abnd 3575 in hard sand.

Phillip Boyle's Mollie Ingram 1, 330 fr wl 1500 fr nl 100-ac lse, John Maximillian sur, 3 mi s of Redrock, elev 509 ft df, Navarro 503 ft, Taylor 1630 ft, Edwards 2921 ft, abnd 2971 ft.

SOUTHWEST TEXAS WILDCATS

McMullen County—Failure: Stanolind's J. F. Henry 1, (OWDD) 660 fr el 2010 fr sl W. Kuykendall sur 28 on 227-ac lse, otd 6800 ft, abnd 7942 ft after fish job.

Starr County—Failure: Drilling and Exploration Co.'s A. M. Kelsey 1, 330 fr ne&sel BS&F sur 125, 320-ac lse, abnd 3026 ft.

LOWER TEXAS COAST WILDCATS

Bee County—Oil Discovery: Magnolia's W. E. Erp 1, 330 fr s&wl 1349-ac lse, J. B. Watkins sur, 9 mi w of Pettus, perf 22 shots 7974-78 ft, flow 80.4 bbls 35.3-gr oil, 37.6 bbls sw, 27.6 bbls wtr, 7/64-in, td 7605 ft.

Jackson County — Failure: Humble's B. Clements et ux 1, 428.8 fr se&nwl 1800 fr swl 80-ac lse, John J. Linn sur A-213, El Toro area, abnd 6863 ft.

LaSalle County—Failure: Transwestern Oil Co.'s D. C. Reed and H. C. Storey 1, 1650 fr wl 990 fr sl w½ A. Sullivan sur 140, abnd as oil test, set plug 2719-39 ft, comp as wtr well in Carrizo.

TEXAS GULF COAST WILDCATS

Ft. Bend County — Failure: Westland Oil Co.'s R. M. Caldwell 1, 330 fr wl blk 2, 100-ac lse, W. S. Hall Lge A-31, 1 mi e of Hawdon, abnd 6505 ft.

Galveston County—Failure: Skelly's R. E. Paine 1, 467 fr nw&swl lot 3 171-ac lse S. E. Whitney subdvn blk E Central Park subdvn, Sarah McKissick Lge, ¼ mi s Friendswood, abnd 6754 ft.

Hardin County—Gas Discovery: Houston Oil Co. of Texas-American Republics Corp.'s Fee-Hardin County School Lands 1, 467 fr el 1401 fr nl 956.7-ac lse, perf 5798-5812 ft, 47 mln gas open flow, shut in, tp 2050 pounds, cp 2200 pounds, 9/64-in, td 7006 ft.

Harris County—Failures: Eltex's Mrs. Anna Scott 1, 150 nely at ra fr Cypress Crk rd, 800 sely at ra to m/sly/nl H&TB sur 1, 270-ac lse, Westfield area, elev 94.6 ft, abnd 7496 ft.

J. E. Ludeau's Overly Est. 1, 310.5 fr n&sl 40.5-ac lse, Wiley Smith sur A-711, 10 mi n of Houston, abnd 4092 ft.

Glenn McCarthy's H. Reichart 1, 350 fr nwl 461 fr nel 63.6-ac lse, A. Scales sur 687, 1.1 mi sw of Spring, abnd 6800 ft.

EAST TEXAS WILDCATS

Hopkins County—Pickton Discovery: Humble's Nichols 1, 1500 ft snl 660 ft wel Isaac Friddle sur, 4 mi ne Coke field, elev 472 ft, Pecan 2495 ft, Austin 3938-4022 ft, Woodbine 4537 ft, Georgetown 5204 ft, Paluxy 6313 ft, Glen Rose 6680 ft, Massive anhydrite 7730-7876 ft, Pittsburg 8442 ft, flow 620 bbls 52.2-gr, natural via ¼-in, tp 1710 lbs, cp 1825 lbs, perf Bacon (Rodessa) 7888-96 ft, td 8850 ft in Travis Peak.

Hunt County—Failure: Homer W. Snowden-N. G. Landrum's Gentry 1, 1850 ft nsl 7500 ft ewl Shelby CSL sur, elev 526 ft, Pecan 528 ft,

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Oil City's Good Castings are enlisted in the Battle of Production.

OIL CITY BRASS WORKS
FOUNDERS MANUFACTURERS MACHINISTS

Gober 1290 ft, Austin 1590 ft, Woodbine 2600 ft, abnd 3286 ft.

Robertson County—Failure: W. H. Doran et al's Fogle-Woodall 1-A, L. Purdy sur, 6½ mi nw Calvert, go fr swc of sur at river bank th 330 ft ne alg sur line th nw at ra 330 ft, Midway 527 ft, base Wills Point 997 ft, abnd 1011 ft.

NORTH TEXAS WILDCATS

Archer County—Failures: D. H. Bolin et al's John Purcell 1, 450 ft nsl 150 ft wel blk 75, Jefferson CSL sur, abnd 1205 ft.

Chas. E. Morrison-Maguire Industries' McGregor 3, 1470 ft wel 175 ft nsl blk 4, Coleman subdvn of Brazos CSL sur, abnd 980 ft.

Republic Natural Gas Co.'s King 1, 330 ft nsl 3620 ft ewl of Wm. Henry sur A-163, elev 1074 ft, Bend 4964 ft, Ellenburger 5670 ft, abnd 5684 ft.

Clay County—Failure: Bridwell Oil Co.'s Ewers 1, 467 ft out sec sect 14, blk 1, Clark-Plumb sur, elev 938 ft, Bend 5352 ft, abnd 5429 ft.

Wichita County—Failure: Jackson & Davenport's Wilson 1, 150 ft out swc nw of S.P. Ry. 3, A-265, abnd 1840 ft.

WESTERN CANADA WILDCATS

South Alberta Plains — Birdsholm: California-Standard's Birdsholm-Province 1, lsd 14 33-4-11w4th, abnd 3131 ft in Madison lime.

Eureka: California-Standard's Eureka-Province 1, lsd 9 19-8-13w4th, abnd 3258 ft in Madison lime.

United States Wildcat Starts

ARKANSAS

Ashley County: Lion Oil Refining Co.'s Betty 1, ne ne 29-17s-4w, lcn 4500-ft test.

ILLINOIS

Bond County: Texas Co.'s Miller 1, nw nw nw 22-6n-2w, lcn.

Clinton County: Joe May et al's Carlye Park Comm. 11, nw nw nw, dr, 198 ft.

Effingham County: H. Luthell et al's Stousis 1, nw nw ne 25-6n-5e, lcn.

Franklin County: E. S. Adkins' Old Ben Coal 1, sw se sw 15-7s-3e, dr 200 ft.

Greene County: W. H. Wright's Doran 1, nw nw nw 29-9n-13w, lcn.

Hamilton County: Sinclair Wyoming's Russell 1, sw se sw 17-7s-5e, lcn.

Jasper County: Pure's Dhom 1, sw sw se 34-7n-10e, lcn.

Jefferson County: W. I. Lewis' Schul 1, se se nw 9-3s-3e, lcn.

Marion County: Continental's Simmons 1, ne ne se 22-1n-4e, lcn.

Gulf's Maulding 1, se se nw 14-4n-3e, lcn.

Wayne County: Pure's White 1, sw nw se 6-1n-9e, lcn.

Aetna Oil's French 1, sw se se 15-1n-9e, dr 175 ft.

INDIANA

Huntington County: Texas Co.'s M. H. Hacker 1, ne ne ne 21-27n-9e, lcn.

Wabash County: Texas Co.'s Harwood 1, sw sw sw 19-27n-8e, lcn.

KANSAS

Barton County: Vickers' Steiner 1, ne ne se 34-17s-12w, lcn.

Butler County: Glen Smith's Red Ranch 1, nec 13-23s-8e, lcn.

Mark Adams-Wakefield's Adams 1, ne nw 2-30s-5e, dr 1194 ft.

Grallup & McNish's Fee 1, sw se nw 12-31s-3e, lcn.

Grallup & McNish's Roberts 1, sw se sw 12-31s-3e, lcn.

Adair & Huber's Jacobshagen 1, sw sw sw 6-31s-5e, lcn.

Cowley County: Creekmore & Rooney's Seacat 1, nwc 26-33s-4e, lcn.

Texas Co.'s Ott 1, swc 8-33s-6e, dr 1775 ft.

Zephyr Drlg. Co.'s Warren 1, ne se sw 6-35s-5e, dr 750 ft.

Douglas County: Huber's Mohler 1, c nw ne 22-12s-20e, lcn.

Ellis County: Bridgeport et al's Sessin 1, se sw se 15-11s-19w, lcn.

W. L. Hartman's H. M. Huser 1, swc 3-15s-16w, dr 1250 ft.

Ellsworth County: Continental's Adams 1, sw nw ne 20-18s-8w, lcn.

D. R. M. Drlg.'s Behnke 1, sec sw 36-18s-10w, dr 1470 ft.

Finney County: Stanolind's Fidelity St. Bk. 1, c nw 34-26s-31w, lcn.

Marion County: Ward McGinnis' Stenzel 1, ne nw nw 10-19s-4e, lcn.

Ness County: Texas Co.'s Boyd 1, swc 24-19s-24w, lcn.

Reno County: Ward McGinnis et al's Columbian Hog & Cattle 1, ne ne sw 12-25s-7e, lcn.

Rooks County: Bridgeport's Atherton 1, nec nw 32-10s-19w, lcn.

Saline County: Ingling et al's Wilson 1, nwc sw 12-16s-1w, dr 1455 ft.

Amerada's Effie Harmon 1, nec sw 8-18s-1w, lcn.

Sedgwick County: Model & Roland's Gorges 1, nw sw nw 8-28s-1w, lcn.

Sherman County: Sinclair Prairie's Cogswell 1, swc 20-10s-38w, lcn.

Stafford County: Maguire Industries' Hartnett 1, nec 34-23s-11w, lcn.

Maguire Industries' Tretbar 1, se sw sw 12-25s-11w, dr 1020 ft.

Sumner County: Skelly & Magnolia's Theis Est. 1, sec nw 31-26s-4w, lcn.

KENTUCKY

Butler County: Sharp et al's Hammer Heirs 1, 12-I-32, lcn.

Daviess County: J. C. Ellis et al's D. Salmon 1, 16-N-30, lcn.

D. R. Snyder et al's Hollis 1, 9-Q-30, lcn.

Grayson County: Texas Co.'s Allen Comm. 1, 9-M-36, lcn.

Henderson County: Sinclair Prairie's McNeely 1, 23-Q-20, lcn.

McLean County: Miller & Shiarella's Hayden 1, 3-M-29, dr 186 ft.

Webster County: Sinclair Prairie's Bozarth 1, 24-M-22, lcn.

NORTH LOUISIANA

Bienville Parish: G. H. Pierce-R. H. Crow's E. W. Merritt 2, 13-17n-7w, Nacatosh test, dr 755 ft.

De Soto Parish: E. P. Jarvis' Franklin et al 1, 6-11n-12w, lcn.

Grant Parish: Calapor Mfg. Co.'s Edenborn 1, 20-7n-3w, dr 3575 ft.

Rapides Parish: Louisiana Land and Exploration Co.'s Bentley Tr. 2 et al A-1, 25-5n-3w, lcn Wilcox test.

Union Parish: J. H. Strief's Frost Lumber Lands 1, 23-23n-2w, lcn 3500-ft test.

SOUTH LOUISIANA

St. Landry Parish: Claude F. Morgan's Frank Dimmick 1, 1650 n 80° 45 mins w 340 n 9° 15 mins e of sec 173-7s-4e, lcn 10,400-ft test.

MISSISSIPPI

Jasper County: Gulf's Edwards-Bailey 1, c nw se 27-10n-13w, mim.

Lauderdale County: Mid-Southern Drilling Corp.'s Bunnie Jene Clark 1, c nw sw 13-8n-17e, lcn.

Wilkinson County: Rogers Lacy's J. F. Rollins 1, c nw se 43-1n-1e, lcn.

NEBRASKA

Richardson County: E. S. Towle's Fee 1, sec 34-3n-15e, lcn.

NEW MEXICO

San Juan County: Kutz Deep Test's Federal 1, c nw nw 28-28n-10w, (OWDD) otd 1653 ft, mim.

OKLAHOMA

Caddo County: C. C. Lynch's Peterson 1, ne ne nw 3-5n-12w, lcn.

Comanche County: Sinclair Prairie's Ziegler 1, sw nw nw 33-3n-10w, lcn.

Creek County: Flynn Oil Co.'s Franklin 1, ne ne 30-19n-8e, dr 355 ft.

Ellis County: Sinclair Prairie's Berryman 1, ne ne ne 3-17n-24w, lcn.

Garvin County: C. L. Carlock's Blythe 1, nw nw nw 29-1n-1e, rur.

Hughes County: Creekmore-Rooney's Fleet 1, ne ne se 10-8n-10e, mir.

Jefferson County: Bridwell's Trout 1-B, nw nw se 3-7s-6w, dr 1335 ft.

Glitsch & Sons' Allen 1, ne nw nw 9-7s-7w, lcn.

Marshall County: Phillips' Gipson 1, se se ne 10-6s-6e, lcn.

Oklahoma County: Gulf's Beck 1, sw sw sw 15-14n-2w, rur.

Payne County: V. L. Cromwell's Price 1, se sw nw 9-20n-4e, lcn.

WEST TEXAS

Ector County: Shell-Cities Service's T. P. Land Trust 1-B, 1999 ft snl 667 ft wel T&P Ry. 19, blk 45, T-1-S, 1½ mi s of prospective deep strike, lcn 8500-ft test.

Gaines County: Rowan Drlg. Co.'s H. C. Schumaker 1, 510 ft out swc labor 2, Lge 298, Reagan CSL sur, lcn 6000-ft test.

J. F. Smith et al's Mrs. R. M. Dodge A-1, 1983 ft wel 1980 ft nsl D&W sur, sec 38, blk H, 3¼ mi nw of Cedar Lake outpost well, lcn 5250 ft test.

Garza County: Honolulu Oil Corp.-Devonian Oil Co.'s S. C. Storey 1, 1980 ft out sec E. L. & Ry. sec 1303, 2¾ mi se of PHD pool, 5000-ft test, dr 310 ft.

Kent County: Sohio's J. E. Kuteman 1, c ne ne H&GN Ry. 44, blk 4, 9½ mi sw Clairemont, lcn 8000-ft Ellenburger test.

Pecos County: Southern Union Gas Co.'s M. Monroe 1, 330 ft out sec T.M. Ry. 10, blk 193, lcn 2300-ft cable test.

R. E. Rawlins et al's F. J. Ellyson 1, ne ne

sw T&St.L. Ry. 32, blk 140, 1⅝ mi s by w shallow production, lcn.

Humble's Riggs-Lewis 1, se ne nw T&St.L. Ry. 3, blk 146, 1⅛ mi se Ft. Stockton, 2800-ft Yates sand pool, lcn 3000-ft test.

WEST CENTRAL TEXAS

Eastland County: Whitaker Oil Co.'s W. L. McDonald 1, 1320 ft nsl 660 ft wel of 622-ac tract in W. T. House subdvn of Harvey Kendrick sur, lcn 3800-ft test.

McCulloch County: Anzac Oil Corp.'s G. R. White 2, 440 ft wel 240 ft nsl of J. W. Hagerlund sur 80, lcn 1500-ft Ellenburger cable test.

Taylor County: Onyx Ref. Co.-Jones & Stasney's Minnie Bowles 1, 2420 ft snl 2130 ft wel sec 25, Blind Asylum Lands, lcn 2150-ft cable test.

SOUTH CENTRAL TEXAS

Atascosa County: Harry S. Stahl's Mary Ann Suggs 1, 1000 fr nl 1000 fr wl 180-ac tr, 1000 fr wly wl 700 fr sl Simon Fisk sur 1171, lcn 1000-ft test.

Gonzales County: Danciger O&R Co.'s H. Siedel Weber 1, 1980 fr sel 330 fr nel 419.5-ac lse, Geo. W. Petty sur, 3 mi se Smiley, lcn 4200-ft test.

Travis County: Stubbs and Foster's Laddie and Joe Lundell 2, 450 sw of No. 1 200 fr sl of tr, lcn 1150-ft test.

Val Verde County: Texas Gas Utilities Co.'s Holman Est. 1, 330 n&e of sect 47, GH&SF sur, blk N, lcn 3500-ft test.

SOUTHWEST TEXAS

Jim Hogg County: Delk Investment Co.'s E. L. Armstrong 1, 2310 fr el sur 107 330 n of sl 80-ac lse, 6 mi sw Hebronville, lcn 3800-ft test.

Webb County: Dulup Oil Co.'s Bruni 4, 990 fr el 330 fr nl blk 75, 360-ac lse, Albercas Gr, elev 824 ft, lcn 1850 ft.

Coastal Refineries' A. M. Bruni 1, 330 fr n&el se¼ sur 73, 577-ac lse, 10 mi s Mirando City, lcn.

Zapata County: Bridwell Oil Co.'s Rosa G. de Rodriguez 1, 467 ne of swl 6235.5 se of nwl of Sh E. Charco Redondo Gr, 12 mi ne of Lopena, lcn 1900-ft test.

LOWER TEXAS COAST

Hidalgo County: Kingwood Oil Co.'s John H. Shary 1, 660 fr nl 660 fr wl 4800-ac lse in c of lot 11, se¼ of sw¼ of blk 27, San Salvador del Tule Gr, lcn.

Karnes County: Southern Minerals Corp.'s S. Lorenz and R. L. Mendoza 1, 1100 fr sl 660 fr sl Cibolo River 85-ac lse, J. A. Lorenz Pre-emp. sur, 10 mi ne Karnes City, lcn 4500-ft test.

Refugio County: Hewit & Dougherty's K. D. Roche 1, 1475.8 fr nwl 467 fr sel blk 59 200-ac lse, Thos. O'Connor sur, lcn 7500-ft test.

TEXAS GULF COAST

Brazoria County: Salt Dome Oil Corp. et al's F. P. Law et al 1, 330 fr s&el lot 15 330 fr sl 990 fr wl sect 75 40-ac unit HT&B sur A-299, lcn 8500-ft test.

Chambers County: Standard of Texas' State-Galveston Bay 1, 660 fr sel 1980 fr swl sect 110 State Land 640-ac lse, Smith Point area, lcn 9000-ft test.

Colorado County: Shell's Kyle Est. 1, 642 fr nwl 660 fr swl 76.9-ac lse, J. Grant sur A-233, 4 mi n of Garwood, elev 175 ft, lcn 12,000-ft test.

Wharton County: H. M. Amsler's Mrs. M. L. Heard 1, 660 fr n&sl 660 fr el 80.7-ac lse, ½ mi ne of swl of county, 2501-ac lse, T. J. Winston sur, lcn 6500-ft test.

J. A. Gray's T. N. Mauritz A-1, 330 fr s&wl sect 11 and M&C sur A-296 and 40-ac lse, lcn 6500-ft test.

Texas Co.'s C. D. Bergstrom et al 1, 660 fr nl 1980 fr el sect 37 320-ac lse, WCRR sur 37, otd 4510 ft, to deepen to 5200 ft.

Texas Co.'s H. R. Matzke 1, start wl 262-ac lse and sect 26 at intersection with road go 3000 ne alg s ROW of road th 330 se at ra to lcn 1729.5 fr sl lse and n½ sect 26, lcn 6500-ft test.

EAST TEXAS BORDER COUNTIES

Panola County: Humble's L. H. Pirkle 1, 3350 se of nwl 2100 ne of swl Mitchell Smith sur, 2½ mi sw Carthage, lcn Travis Peak test.

EAST TEXAS

Anderson County: J. B. Daniels et al's J. H. Handorf 1, 467 ft nsl 467 ft w of m/w/el of 200-ac tr, or 3350 ft ewl 950 ft n of m/s/sl Joseph Humphrey sur, 5 mi n Palestine, mim for 5500-ft Woodbine test.

Houston County: F. K. Lytle et al's S. Watson 1, 568 ft snl 761 ft wel of 55-ac tr, or 761 ft wel 2550 ft nsl of R. de los Santos Coy sur, 12 mi se Crockett, lcn 6000-ft Woodbine test.

Navarro County: J. B. Daniels et al's Wayne Milligan 1, 960 ft fr swl 330 ft fr nwl 400-ac tr, or 6425 ft fr sel 4000 ft fr swl of Martin Latham sur, 3 mi e Richland, 6000-ft test, dr 1725 ft.

Upshur County: W. W. Bradley et al's R. W. Simpson 1, 400 ft nsl 1200 ft ewl of J. J. Hooper sur, 67-ac lse, mile e of Gilmer, 5300-ft Paluxy test, dr 110 ft.

NORTH TEXAS

Archer County: Bridwell Oil Co.'s Margaret Hancock 1, 2310 ft nsl 2050 ft ewl H&TC Ry. 3, blk 1, lcn 6000-ft Ellenburger test.

H. M. Kelleher et al's C. L. Abercrombie 1, 1150 ft ewl 894 ft nsl of Wm. Cound sur A-798, lcn 1450-ft test.

D. H. Bolin et al's C. L. Abercrombie 1-I, 1600 ft ewl 750 ft snl blk 104, J. Campbell sur A-61, lcn 1450-ft rotary test.

Clay County: Continental Oil Co.'s Annie T. Morris 1, 330 ft wel 1529 ft snl of W. Davis sur A-119, lcn 6100-ft Ellenburger test.

Cooke County: Phillips' B. Inglish-Eppie 2, 2344 ft nsl 1281 ft wel of J. F. Davidson sur A-336, twin to 2510-ft jkd wildcat, rig.

Grayson County: Texas Co.'s J. R. Randy 1, 2000 ft nsl 4750 ft ewl Samuel Stewart sur A-1069, mim for 3500-ft rotary test.

Montague County: Sinclair Prairie's Frank Foster 1, 660 ft nsl 496 ft ewl sec 179, J. H. Belcher subdvn of Jose Olibarri sur A-579, lcn 7000-ft Ellenburger test.

Wichita County: Walter E. Gudbert et al's Minnie Van Loh 1, 1350 ft nsl 150 ft wel Mrs. T. E. Williams sur A-513, lcn 2000-ft test.

Young County: F. B. Paine Drlg. Co.'s Mary Criswell 1, 660 ft e 380 ft n of nwc of J. A. Jowell sur A-1330, but in A. B. Ledbetter sur A-1689, lcn for 4000-ft test.

WESTERN CANADA

Central Alberta Plains—Lloydminster: General Petroleum's No. 1, ne lsd 16 14-49-1w4th, dr.

The OIL WEEKLY'S TRADING POST

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■ **One Cardwell Model R, Double Drum Spudder; One Fort Worth Jumbo C spudder. Tools complete and steel dog houses for both. Call 3846 or write Lesh Drilling Company, 210 South Main Street, Henderson, Kentucky.**

■ For Sale: Complete gasoline rotary drilling rig, $9300.00. Might consider shallow contracts. A. R. Lewis, Corsicana, Texas.

BLUE RIDGE FIELD—FORT BEND COUNTY, TEXAS

20 acre Blakely lease—4 non-producing wells about 3700' deep—4 derricks—3 tanks—pumping units—small steam drilling rig—Two 8½ Hp. Broderick boilers—Steam pumps—85 Hp. Cardwell pulling unit and miscellaneous lease equipment.

BIG CREEK FIELD—FORT BEND COUNTY, TEXAS

Two wells on 10 acre Ahler lease—1 producing 18 barrels per day—two tanks—warehouse and miscellaneous lease equipment. Sale price to be approved by Federal Court at Houston on November 25, 1944.

TRANS STATE OIL COMPANY
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Tested and Guaranteed
LARGE STOCK OF FITTINGS
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1—5 x 10 Wheatley Direct Drive Pump, unitized with Buda FRH Motor.
1—5 x 10 Gardner Denver Low Pressure Power Pump, skidded less Motor.
1—3 x 4 Gardner Denver Power Pump.
1—6 x 4 x 6 Worthington Steam Pump.
1—18" Wilson-Snyder High Pressure Steam Slush Pump.
1—20" Gardner Denver High Pressure Steam Slush Pump.
1—Emsco Type A 36"—5 Sheave 1⅛" Travelling Block.
1—Oilwell 66" x 36"—5 Sheave 1⅛" Travelling Block.
1—44"—4 Sheave 1⅛" Emsco Crown Block.
1—6" 150 Ton Gumbo Buster Swivel.
2—6" Ideal Type G.S. Swivels.
2—4" Ideal Type G.S. Swivels.
1—McNeely Shale Shaker, complete overhauled, Motor Driven.
1—Link Belt Shale Shaker, completely overhauled, Steam Driven.
1—12 x 12 Oilwell Horizontal Twin Piston Valve Type Steam Engine.
1—27½" Type FE Union Tool Rotary.
1—No. 12—25½" Union Tool Rotary.
2—Emsco Type D 25½" Rotaries.
2—Oilwell 17" Junior Make and Break Rotaries.
400—8-V-Thread, Grade C Casing Couplings.
All sizes BJ Break Out Tongs, Casings, Tubing Elevators, Tubing Slips and Bowls.
1—30" 3000 Watt Delco Automatic Gasoline Light Plant.
1—66 H.P., 6 cylinder, WXT Hercules Gas or Gasoline Motor.

Address: Box 33, c/o The Oil Weekly, Houston, Texas.

FOR SALE

■ **FOR SALE: 1—7000 ft. Power Rig with Lee C. Moore Cantilever Derrick (Good rig for Miss.). 2—4000 ft. Power rigs with Lee C. Moore Cantilever Derricks. 1618 Maury Street, Houston, Texas. F-2904.**

■ FOR SALE: 35,000 ft. 8⅝" OD 21.31 lb. L.W. Line Pipe in 40-ft. Lengths P.E. Beveled Used, but in excellent condition. UTILITY & INDUSTRIAL SUPPLY COMPANY, 921 E. Michigan Ave., Jackson, Michigan.

HELP WANTED

■ **Wanted water well drillers for capable tool and rotary drilling. Florida territory. Wages $1.25 per hour, 40 hour week, time and half for over-time. Unless you are well qualified, do not apply. Address: Box 31, c/o The Oil Weekly, Houston, Texas.**

■ **Oil field salesman for West Texas Territory. Thorough experience in Oil Well production equipment. Also Sales Engineer for Houston Territory. By company manufacturing control equipment for over 22 years. When apply state age, experience, education, etc. Address: Box 27, c/o The Oil Weekly, Houston, Texas.**

■ **The Eastman Oil Well Survey Company has a Field Sales and Service position open in the Texas Gulf Coast area. Applicant must have good knowledge of and be well acquainted in the oil well drilling industry in this area. Attractive salary. Expenses and car furnished. Please mail written application to Post Office Box 8128, Houston 4, Texas.**

■ **Chemical Engineer to engage in research and development work with major oil company along crude oil producing lines. Would include some field work. Recent graduates of interest. Position offers good future. Give full personal data, experience, and salary desired. Our employees know of this advertisement. All answers strictly confidential. Address: Box 30, c/o The Oil Weekly, Houston, Texas.**

■ **Research Geophysicist with several years experience preferably including field work and laboratory work, to engage in research geophysics with major oil company. In charge of work including evaluation of new ideas and experimental development of same. Position offers good future. Give full personal data, experience and salary desired. Our employees know of this advertisement. All answers strictly confidential. Address: Box 28, c/o The Oil Weekly, Houston, Texas.**

■ **Engineer or Physicist to engage in study of reservoir performance as related to physical properties with major oil company. Individual should have aptitude and background to enable the mastering of mathematical analysis of problems in flow of fluids. Position offers good future. Give full personal data, experience and salary desired. Our employees know of this advertisement. All answers strictly confidential. Address: Box 29, c/o The Oil Weekly, Houston, Texas.**

NOTICES

■ **CAPITAL SEEKERS—Interested in raising $25,000 or more for a postwar project should writer to AMSTER LEONARD, Fox Bldg., Detroit 1, Mich.**

SERVICES

■ **Gravity Meter Survey Service, with or without Seismographic shooting. Make contracts now for early 1945 season. Address: Box 32, c/o The Oil Weekly, Houston, Texas.**

BE SURE TO CHECK THE
TRADING POST SECTION
PAGE 85 OF THIS ISSUE

PAGES 3079 THRU 3098
IN THE 1943-44
COMPOSITE CATALOG

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Squeaks from the Bull Wheel

Poet's Nook

Susie has a nice new skirt,
So neat, so bright, so choosy;
It never shows a speck of dirt,
But, gosh, how it shows Susie!

Pleasant Task

Order received by transport sergeant: Four trucks to be ready at 1930 hours for conveying girls to dance. The bodies must be cleaned and seats wiped off. All curtains in place.

A Heroine

Excerpts from the diary of a female voyager:

Monday: "Was flattered to be placed at the captain's table."

Tuesday: "Spent the morning on the bridge. The captain seems to like me."

Wednesday: "The captain's proposals are unbecoming to an officer and a gentleman."

Thursday: "The captain threatens to sink the ship if I do not agree to his proposal."

Friday: "I have saved 600 lives."

The Age of Speed

Down in South America they have discovered a sheep that can run 60 miles an hour.

It takes that kind of a lamb to keep up with Mary nowadays.

Bargain's a Bargain

Classified ad: "Going out of business. Coffins at half price."

Headline the next day: "Eighteen Scotchmen Commit Suicide."

Short Trip

New Missionary: "What became of my predecessor?"

Cannibal chief: "He made a trip into the interior."

Two Tries

"I hear you had a date with Siamese twins last night. Have a good time?"

"Well, yes and no."

That's Different

"I'm divorcing you. Four days ago I saw you hold the maid's hand. Three days ago I saw you hug her. Two days ago I saw you kiss her. And last night I saw—"

"But, darling, you asked me to persuade her not to quit, didn't you?"

"Oh, honey, tell me quick—did she promise to stay?"

Where Art Thou?

Coming across a shady cemetery one hot summer's day, a wayfarer entered to sit down and cool off. Presently he espied a tombstone on which was this inscription:

Pause, stranger, ere you pass me by
As you are now, so was I.
As I am now, so will you be
Prepare for death and follow me.

Whereupon the wayfarer took out his penknife and beneath the inscription scratched these words:

To follow you
I'll not be content
Until I learn
Which way you went.

Hold That Bus

"All right back there?" shouted the bus driver.

"No. Wait 'til I get my clothes on!" replied a feminine voice.

So the driver led the stampede to the rear and watched a girl get on with a basket of laundry.

Vicious Circle

"Chief," said the energetic young man to the lazy Indian, "why don't you get a job in a factory?"

"Why?" grunted the redskin.

"Well, if you worked hard and saved your money you'd soon have a bank account and some day you wouldn't have to work any more."

"Not working now," yawned the Indian.

Also Present

It was the eve of their wedding and he was angry because his bride-to-be was neglecting him in the bustle of last-minute preparations.

"But, darling," she soothed, "if our wedding is to be a success we mustn't overlook the most insignificant detail."

"Oh, don't worry about that. I'll be there."

Just a Gentleman

"Did you get home all right last night?" asked the bus driver of a regular passenger.

"Sure. Why?"

"Well, when you got up and gave the lady your seat last night, you were the only two people on the bus."

Reluctant Assent

A young banker picked up the telephone in his office: "No," he said, "No, no, no. YES. No, no." With a final explosive "NO," he hung up.

The head of the firm, who had been listening, asked him sternly, "What was the idea of saying "yes" to that fellow?"

"I had to, boss. He asked me if I could hear him."

BETTER
Steel Forgings for
CHRISTMAS TREE FITTINGS
BEAUMONT
WELL WORKS COMPANY
BEAUMONT, TEXAS

Notes for the Equipment Buyer and User

Multiple Engine Combinations

DETROIT DIESEL ENGINE DIVISION, GENERAL MOTORS

Detroit Diesel Engine Division, General Motors Corporation, Detroit, Michigan, has developed a new technique of engine combinations which is expected to find significant application in the oil industry. By these combinations, horsepower can be multiplied as desired to increase delivery to a single driveshaft, thereby resulting in important savings in weight and space.

In the basic engine a symmetrical block permits right or left hand rotation. Blower, starting motor, generator, and other accessories can be placed on either side, and moving parts such as pistons, connecting rods, valves, etc., are interchangeable. By placing accessories on the "out" side, the engines can be located exceptionally close to each other in pairs.

One of the new combinations is the "Twin," consisting of two standard Series 71 six-cylinder General Motors 2-cycle Diesel engines geared by a transfer case to a common driveshaft in such a manner that the complete assembly occupies relatively little space. Another combination is the "Quad," which further utilizes these design features by mounting two pairs of engines in a base in such a way that all four engines are attached to a gear box located centrally. Thus, the power is geared to a shaft beneath the center of the entire assembly. Controls are located at one side of the centralized gear box in both the Twin and the Quad. Each individual engine of either unit can be operated singly, or in the case of the Quad, one, two, three or four engines can be operated, depending upon the power requirements.

The idea of using these engines in combinations evolved from the need of some such type power plants in tanks and landing craft being used by the Army and Navy. The Twin 6-71 powers the M-3 and M-4 Tanks and the M-10 Tank Destroyer. Nearly all landing craft built in America are powered by standard six-cylinder Series 71 units, in single or multiple form.

Combining basic engines into multiples offers many advantages for peacetime applications, and will probably provide the basis for phenomenal progress in mechanical power development.

These same combinations are built with radiator cooling for industrial applications and will find many oil field applications where portability and high horsepower output per pound of weight are desirable.

Name Changed

Petersen Drilling Company is the new name of the organization formerly known as Price-Petersen Drilling Company, New Orleans. D. J. Price, a former partner, withdrew September 26. All affairs and obligations of the old company have been assumed by the new.

General Motors 6-Cylinder Twin

Dowell Incorporated Moving Three Divisions to Tulsa

Dowell Incorporated, subsidiary of The Dow Chemical Company, is moving its engineering, construction and purchasing divisions to Tulsa, where it maintains headquarters, and has broken ground for a $200,000 group of buildings on a 20-acre site at North Utica and Latimer streets.

Divisions to be moved to the Oklahoma headquarters are now in Bay City and Midland, Michigan. Dowell plans 3 steel buildings, one for manufacture of plastics, another for a truck assembly plant, and the third as a shower and change room for employes. Plastics have been manufactured in the Tulsa branch since about 1934 and equipment used in the process will be installed in the new building. Dana G. Hefley, Tulsa, director of research, will have charge of the manufacture of plastics.

G. N. Thresher, formerly chief engineer of Cliffs Dow Chemical Company, Marquette, Michigan, a subsidiary of The Dow Chemical Company, has been transferred to Tulsa, and is chief engineer in charge of constructing the new buildings.

Allis-Chalmers Appoints Pacific Regional Manager

Allis-Chalmers, Milwaukee, Wisconsin, announce appointment of A. J. Schmitz as Pacific regional manager. Prior to this appointment, he was manager of the Seattle, Washington, office, and formerly was manager of the Portland, Oregon, office. He has been with the company since 1914.

Wins Army-Navy E

Star Drilling Machine Company, Akron, Ohio, has been awarded the Army-Navy E for excellence in production of water well drilling equipment. Vice Admiral Ben Morell praised the equipment and told how it had been used to establish a vitally important water supply for thousands of troops at a Pacific staging area. The rig was later used at another advance base to supply large quantities of water, in addition to digging many drainage holes in connection with mosquito control activites.

Assistant Sales Manager Named by Cooper-Bessemer

Cooper-Bessemer Corporation, Mount Vernon, Ohio, announced that A. M. Buxton has been promoted to assistant sales manager, with headquarters at Mount Vernon.

A. M. Buxton

In addition to sharing responsibilities of general sales manager, he will direct the company's oil and gas field sales, since he has been working closely with these fields in his former position at the Tulsa office. He has been with the company 20 years.

Sales, Merchandise Heads Appointed by U. S. Rubber

United States Rubber Company, New York City, announced appointment of Herman A. Everlien as general sales manager of the mechanical goods division, and Walter F. Spoerl as merchandise manager. Both positions are newly created.

Everlien has had more than 41 years of experience in the mechanical rubber goods industry, and Spoerl 36 years. Both began as clerks in the sales department of Revere Rubber Company, Chicago, later consolidated into the United States Rubber organization.

Vice President, Treasurer Selected by Oster Company

Theodore S. Bonnema, formerly production manager for Oster Manufacturing Company, Cleveland, has become vice president in charge of production, and Lester D. Martin, formerly comptroller, has been made treasurer of the company.

Both have had more than 20 years of service with the company.

Named Sales Representative

H. J. Sheridan, organizer of Production Equipment Company, 310 Thompson Building, Tulsa, announced his firm is serving as state sales representative for the Jensen Brothers Manufacturing Company.

Engine Booklet Issued

Caterpillar Tractor Company, Peoria, Illinois, announces a booklet, form 8657, which discusses and illustrates uses of the company's diesel engines. One section is devoted to oil field operations.

W-K-M Names Pape

W-K-M Company, Incorporated, has named Howard Pape, vice president, with headquarters in Houston. He has been associated with the oil industry since 1519 when he was employed by Tide Water Associated Oil Company. A

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year later he joined Cosden & Company and was with the successor company, Mid-Continent Petroleum Corporation for ten years as chief engineer and mechanical superintendent. He then was with the Crane Company first in charge of sales to the oil industry, but since 1935 as manager of the valve and fittings department in Chicago.

Name Industrial Manager

Dave W. Choate has been named industrial manager at Atlanta, Georgia, Minneapolis-Honeywell Regulator Company and Brown Instrument Company have announced. He started with Brown in 1936 and has been in charge of the Milwaukee branch. W. S. Robards has been named industrial sales engineer at the Milwaukee branch of Brown Instrument Company.

Firms Change Names

Pacific Pump Works, Huntington Park, California, has changed its corporate name to Pacific Pumps, Incorporated.

The name of Mid-Continent Pump Supply Company, Tulsa, Oklahoma, has been changed to Pacific Pumps, Incorporated, Mid-Continent Division.

Clark Equipment Booklet

Clark Equipment Company, Buchanan, Michigan, has published a vest-pocket size, new-products booklet which describes the company's products. These include drills and reamers, electric steel castings, metal spoke wheels, front and rear axles for trucks, transmissions, gears and forgings, etc.

Address Changed

The Jeffrey Manufacturing Company, Columbus, Ohio, announces a change of address for its Houston office. The new address is 3748 Rice Boulevard. T. P. Burke is the manager.

Christmas Tree Manifold Is 15,000 Pounds Test

Oil Center Tool Company, Houston, was host to oil company and equipment manufacturing officials November 3 to celebrate the successful testing of a 15,000-pound test Christmas tree manifold.

Heretofore, 10,000-pound test equipment of this nature has been sufficient to cope with the pressures encountered, but recent deep and extremely high pressure discoveries indicate a definite need for surface control equipment capable of withstanding pressures in the 6000-7000 pounds pressure range with a required minimum safety factor of 2 to 1.

Separator Catalog

Western Pipe and Steel Company of California, Box 2015-G, Terminal Annex, Los Angeles 54, California, has issued a catalog covering Trumble oil and gas separators, covering developments from early days. Illustrated are several types of valves, automatic and manually operated, and replacement parts with charts for valving ad capacity requirements.

Wins Fourth Gold Star

A fourth gold star has been added to the Maritime "M" Pennant of Edward Valve & Manufacturing Company, East Chicago, Indiana, for continued production achievement.

Pulley Catalog Published

The American Pulley Company, 4200 Wissahickon Avenue, Philadelphia, 29, Pennsylvania, has published a new 24-page catalog covering power transmission equipment including split-pulleys and bushings, shaft collars, shaft hangers and bearings, split and solid conveyor pulleys, motor pulleys, belting and drives for short-center and flat-belt drives.

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